Kawasaki

# KXF250 TECATE-4




# All Terrain Vehicle Service Manual

# Quick Reference Guide


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This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

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All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

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## PLEASE DO NOT TAMPER WITH NOISE CONTROL SYSTEM

To minimize the noise emissions from this product, Kawasaki has equipped it with effective intake and exhaust silencing systems. They are designed to give optimum performance while maintaining a low noise level. Please do not remove these systems, or alter them in any which results in an increase in noise level.

## LIST OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| A | ampere(s) | lb | pound(s) |
| ABDC | after bottom dead center | m | meter(s) |
| AC | alternating current | min | minute(s) |
| ATDC | after top dead center | N | newton(s) |
| BBDC | before bottom dead center | Pa | pascal(s) |
| BDC | bottom dead center | PS | horsepower |
| BTDC | before top dead center | psi | pound(s) per square inch |
| °C | degree(s) Celcius | r | revolution |
| DC | direct current | rpm | revolution(s) per minute |
| F | farad(s) | TDC | top dead center |
| °F | degree(s) Fahrenheit | TIR | total indicator reading |
| ft | foot, feet | V | volt(s) |
| g | gram(s) | W | watt(s) |
| h | hour(s) | Ω | ohm(s) |
| L | liter(s) | | |

**Read OWNER'S MANUAL before operating**

# Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of your warranty period, especially, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your vehicle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki vehicle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki vehicles are introduced by the Special Tool Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

## How to Use this Manual

In preparing this manual, we divided the product into its major systems. These systems became the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Spark Plug section.

Whenever you see these WARNING and CAUTION symbols, heed their instructions! Always follow safe operating and maintenance practices.

**WARNING**

○ **This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.**

**CAUTION**

○ **This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.**

This manual contains five more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

○ *This note symbol indicates points of particular interest for more efficient and convenient operation.*

- ●Indicates a procedural step or work to be done.
- ○Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a WARNING, CAUTION, or NOTE.
- ★Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.
- ☆Indicates a conditional sub-step or what action to take based upon the results of the conditional step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

1

# General Information

## Table of Contents

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Cable and Harness Routing . . . . . 1-10
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## Before Servicing

Before starting to service a vehicle, careful reading of the applicable section is recommended to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations, a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Dirt

Before removal and disassembly, clean the vehicle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the vehicle. For the same reason, before installing a new part, clean off any dust or metal filings.

(2) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them evenly a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter of turn and then remove them.

Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(3) Torque

When torque values are given in this Service Manual, use them. Either too little or too much torque many lead to serious damage. Use a good quality, reliable torque wrench.

(4) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.

(5) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(6) High-Flash Point Solvent

A high-flash point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(7) Gasket, O-Ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(8) Liquid Gasket, Non-Permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(9) Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(10) Ball Bearing

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

(11) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals.

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole.

(12) Seal Guide

A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little high temperature grease on the lips to reduce rubber to metal friction.

(13) Circlip, Retaining Ring

Replace any circlips and retaining rings that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

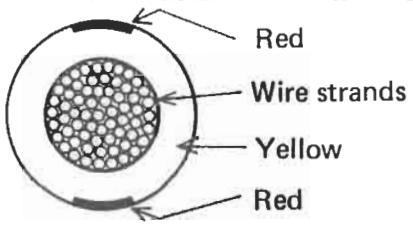
(14) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulfide grease ($MoS_2$) in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(15) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color.

| Wire (cross-section) | Name of Wire Color |
|---|---|
|   | Yellow/red |

(16) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

(17) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

| | | | |
|---|---|---|---|
| Abrasion | Crack | Hardening | Warp |
| Bent | Dent | Scratch | Wear |
| Color change | Deterioration | Seizure | |

(18) Specifications

Specification terms are defined as follows.

"Standards" show dimensions or performances which brand-new parts or systems have.

"Service limits" indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

## Model Identification

KXF250-A1





## General Specifications

| Items | | | KXF250-A1 |
|---|---|---|---|
| **Dimensions:** | | | |
| Overall length | | | 1,800 mm |
| Overall width | | | 1,130 mm |
| Overall height | | | 1,075 mm |
| Wheelbase | | | 1,225 mm |
| Ground clearance | | | 285 mm |
| Seat height | | | 800 mm |
| Dry weight | | | 149 kg |
| Curb weight: | Front | | 80.5 kg |
| | Rear | | 79.5 kg |
| Fuel tank capacity | | | 9.0 L |
| **Performance:** | | | |
| Braking distance | | | — |
| Minimum turning radius | | | 3.2 m |
| **Engine:** | | | |
| Type | | | 2-stroke, single cylinder **piston reed valve |
| Cooling System | | | Liquid-cooled |
| Bore and stroke | | | 67.4 x 70.0 mm |
| Displacement | | | 249 mL |
| Compression ratio | | | 8.7 |
| Carburetion system | | | Carburetor, Mikuni VM34SS |
| Starting system | | | Primary kick |
| Ignition system | | | CDI |
| Timing advance | | | Electronically advanced |
| Ignition timing | | | 18° BTDC @6,000 r/min (rpm) |
| Spark plug | | | NGK B8ES |
| Port timing: | Inlet | Open | Full open |
| | | Close | — |
| | Scavenging | Open | 59.5° (BBDC) |
| | | Close | 59.5° (ABDC) |
| | | Duration | 119° |
| | Exhaust | Open | 88.25° (BBDC) |
| | | Close | 88.25° (ABDC) |
| | | Duration | 176.5° |
| Lubrication system | | | Petrol mix (20:1) |
| Engine oil | | | 2-stroke racing oil |

** : This engine licensed under one or more of Eyvind Boyessen's Patent Nos: 3,905, 340. 3,905,341. Re.30,425. 4,062,331. 4,161,163. 4,202,298 and 4,202,299.

| Items | KXF250-A1 |
|---|---|
| **Drive Train:** | |
| Primary reduction system: | |
| Type | Gear |
| Reduction ratio | 2.818 (62/22) |
| Clutch type | Wet multi disc |
| Transmission: Type | 6-speed, constant mesh, return shift |
| Gear ratios: 1st | 2.357 (33/14) |
| 2nd | 1.750 (28/16) |
| 3rd | 1.388 (25/18) |
| 4th | 1.150 (23/20) |
| 5th | 1.000 (24/24) |
| 6th | 0.880 (22/25) |
| Final drive system: | |
| Type | Chain |
| Reduction ratio | 3.000 (39/13) |
| Overall drive ratio | 7.440 @Top gear |
| Transmission oil: | |
| Grade | SE or SF class |
| Viscosity | SAE 10W-30 or 10W-40 |
| Capacity | 1.15 L |
| **Frame:** | |
| Type | Tubular, double cradle |
| Caster (rake angle) | 4.5° |
| Camber | 0.5° @1G |
| Trail | 39 mm |
| Tread Front | 820 mm |
| Rear | 870 mm |
| Front tire: Type | Tubeless, Knobby/Trail |
| Size | AT 20 x 7.00-10 |
| Rear tire: Type | Tubeless, Knobby/Trail |
| Size | AT 20 x 10.00-10 |
| Front suspension: | |
| Type | Double wishbone-link |
| Wheel travel | 190 mm |
| Rear suspension: | |
| Type | Swing arm (Uni-Trak) |
| Wheel travel | 200 mm |
| Brake type: | |
| Front | Dual disc |
| Rear | Single disc |
| **Electrical Equipment:** | |
| Headlight: Type | Semi-sealed beam, retractable |
| Bulb | 12 V 60 W (halogen) |
| Taillight | 12 V 5.3 W |
| Alternator: Type | Single-phase AC |
| Rated output | 18 V or less @10,000 r/min (rpm) |

Specifications are subject to change without notice, and may not apply to every country.

## Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or liquid gasket.

Letter used in the "Remarks" column means:

**L** : Apply a non-permanent locking agent to the threads.
**LG**: Apply liquid gasket to the threads.
**Lh**: Left-hand threads.
**M** : Apply a molybdenum disulfide grease.
**O** : Apply an oil to the threads and seated surface.
**S** : Tighten the fasteners following the specified sequence.
**St** : Stake the fasteners to prevent loosening.

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

**Basic Torque for General Fasteners**

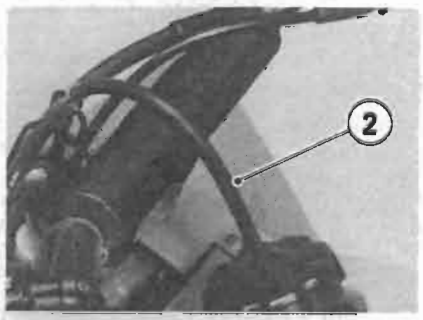
| Thread dia. (mm) | Torque | | |
|---|---|---|---|
| | N-m | kg-m | ft-lb |
| 5 | 3.4 – 4.9 | 0.35 – 0.50 | 30 – 43 in-lb |
| 6 | 5.9 – 7.8 | 0.60 – 0.80 | 52 – 69 in-lb |
| 8 | 14 – 19 | 1.4 – 1.9 | 10.0 – 13.5 |
| 10 | 25 – 39 | 2.6 – 3.5 | 19.0 – 25 |
| 12 | 44 – 61 | 4.5 – 6.2 | 33 – 45 |
| 14 | 73 – 98 | 7.4 – 10.0 | 54 – 72 |
| 16 | 115 – 155 | 11.5 – 16.0 | 83 – 115 |
| 18 | 165 – 225 | 17.0 – 23 | 125 – 165 |
| 20 | 225 – 325 | 23 – 33 | 165 – 240 |

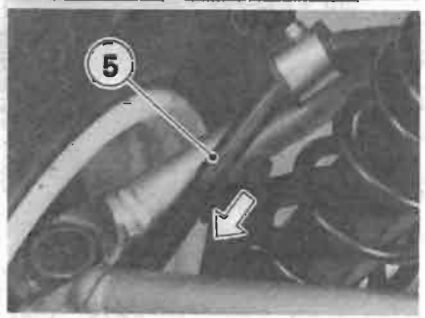
| Parts | Torque | | | Remarks |
|---|---|---|---|---|
| | N-m | kg-m | ft-lb | |
| **Fuel System:** | | | | |
| Filter bracket nuts | 3.9 | 0.4 | 35 in-lb | |
| Fuel tap plate mounting screws | 0.8 | 0.08 | 7 in-lb | |
| Fuel tap knob mounting screw | 1.0 | 0.1 | 9 in-lb | |
| Throttle lever bolt | 5.9 | 0.6 | 52 in-lb | |
| Throttle cable adjusting locknut (carburetor top) | 0.8 | 0.08 | 7 in-lb | |
| Reed valve mounting screws | 1.0 | 0.1 | 9 in-lb | |
| Connector screws (throttle cable lower end) | 1.0 | 0.1 | 9 in-lb | |
| Drain plug | 8.3 | 0.85 | 74 in-lb | |
| Float bowl screws | 3.4 | 0.35 | 30 in-lb | |
| Main jet | 2.0 | 0.2 | 17 in-lb | |
| Pilot jet | 0.8 | 0.08 | 7 in-lb | |
| Float valve retainer screw | 2.0 | 0.2 | 17 in-lb | |
| Starter plunger | 3.4 | 0.35 | 30 in-lb | |
| **Cooling System:** | | | | |
| Coolant air bleeder bolt (cylinder head) | 5.9 | 0.6 | 52 in-lb | |
| Coolant drain plug (cylinder) | 15 | 1.5 | 11.0 | |
| Coolant drain plug (water pump cover) | 7.8 | 0.8 | 69 in-lb | |
| Water pump impeller bolt $\phi$5 | 6.9 | 0.7 | 61 in-lb | |
| **Engine Top End:** | | | | |
| Cylinder head nuts $\phi$8 | 25 | 2.5 | 18.0 | S |
| Cylinder head bolts $\phi$6 | 9.8 | 1.0 | 87 in-lb | S |
| Cylinder nuts | 34 | 3.5 | 25 | S |
| Plug for KIPS valve operating rod (left) | 15 | 1.5 | 11.0 | |

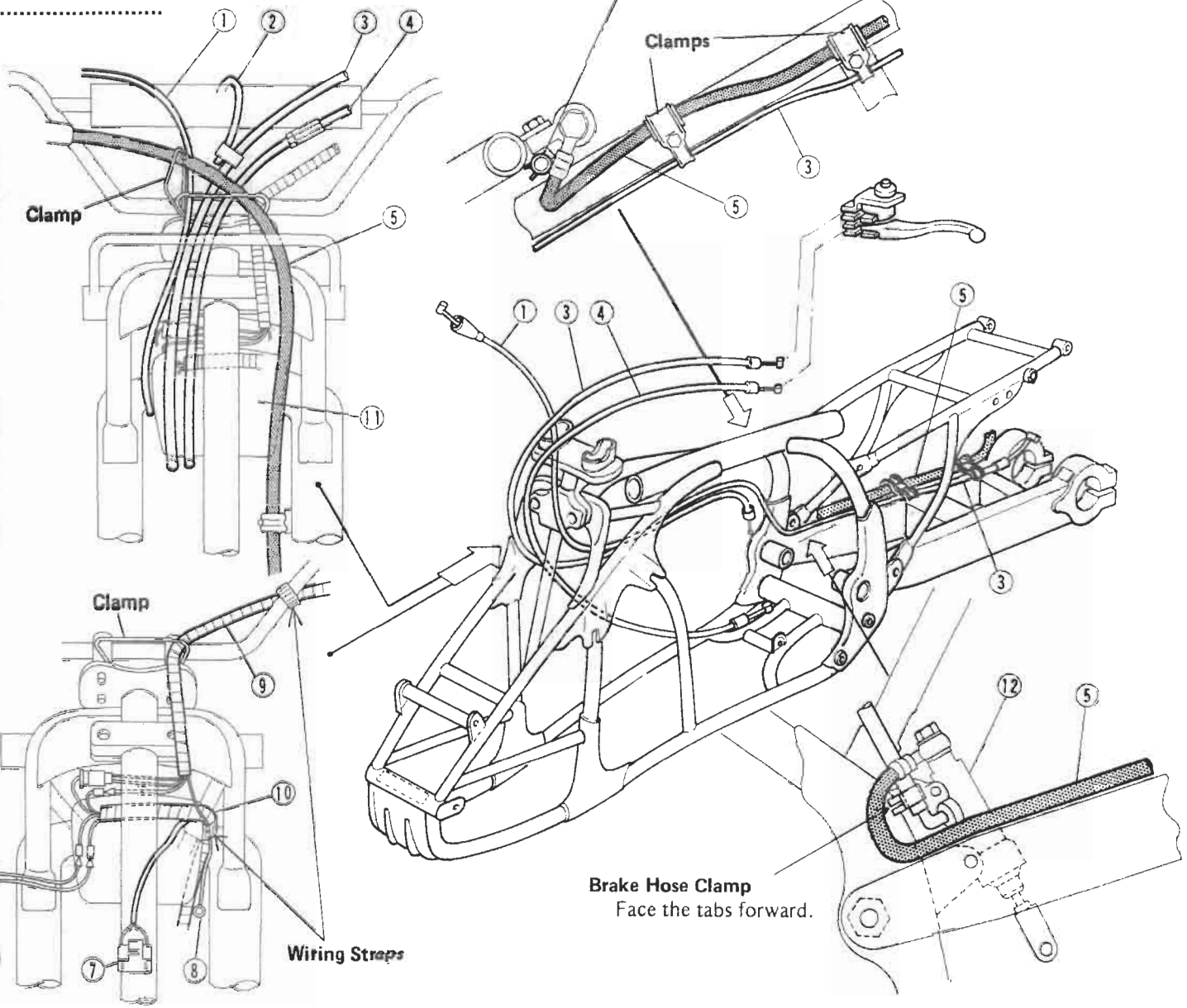
| Parts | Torque | | | Remarks |
|---|---|---|---|---|
| | N-m | kg-m | ft-lb | |
| **Engine Right Side:** | | | | |
| Transmission drain plug | 20 | 2.0 | 14.5 | |
| Kick pedal nut | 25 | 2.5 | 18.0 | |
| KIPS governer lever shaft nut | 9.8 | 1.0 | 87 in-lb | |
| KIPS governer lever Allen bolts | 3.9 | 0.4 | 35 in-lb | |
| Clutch spring bolts | 8.8 | 0.9 | 78 in-lb | |
| Clutch hub nut | 88 | 9.0 | 65 | |
| Primary gear nut (crankshaft) | 78 | 8.0 | 58 | |
| Balancer shaft gear mounting bolts | 9.8 | 1.0 | 87 in-lb | |
| Shift shaft return spring pin | 20 | 2.0 | 14.5 | L |
| Shift drum cam mounting bolt | 22 | 2.2 | 16.0 | |
| **Engine Left Side:** | | | | |
| Shift pedal mounting bolt | 9.8 | 1.0 | 87 in-lb | |
| Magneto flywheel bolt | 27 | 2.8 | 20 | |
| **Engine Removal/Installation:** | | | | |
| Engine mounting bolts and nuts | | | | |
| Front | 25 | 2.5 | 18.0 | |
| Lower | 34 | 3.5 | 25 | |
| Engine mounting bracket bolts | 25 | 2.5 | 18.0 | |
| Swing arm shaft nut | 78 | 8.0 | 58 | |
| **Crankshaft/Transmission:** | | | | |
| Transmission drain plug | 20 | 2.0 | 14.5 | |
| Clutch spring bolts | 8.8 | 0.9 | 78 in-lb | |
| Clutch hub nut | 88 | 9.0 | 65 | |
| Primary gear nut (crankshaft) | 78 | 8.0 | 58 | |
| Balancer shaft gear mounting bolts | 9.8 | 1.0 | 87 in-lb | |
| Shift shaft return spring pin | 20 | 2.0 | 14.5 | L |
| Shift drum cam mounting bolt | 22 | 2.2 | 16.0 | |
| Magneto flywheel bolt | 27 | 2.8 | 20 | |
| **Wheels/Tires:** | | | | |
| Front hub nuts | 34 | 3.5 | 25 | |
| Wheel nuts | 34 | 3.5 | 25 | |
| Rear hub nuts | 145 | 15 | 110 | G (threads and bearing surface) |
| **Final Drive:** | | | | |
| Chain adjuster bolts and nuts (bearing housing clamp bolts and nuts) | 64 | 6.5 | 47 | |
| Chain guard bolts | 31 | 3.2 | 23 | L |
| Rear axle locknuts | 145 | 15 | 110 | L |
| Rear sprocket nuts | 25 | 2.5 | 18.0 | |

| Parts | Torque | | | Remarks |
|---|---|---|---|---|
| | N-m | kg-m | ft-lb | |
| **Brakes:** | | | | |
| Bleed valves | 7.8 | 0.8 | 69 in-lb | |
| Rear master cylinder adjuster locknut | 18 | 1.8 | 13.0 | |
| Torque link nuts | 34 | 3.5 | 25 | |
| Caliper mounting bolts (front and rear) | 25 | 2.5 | 18.0 | |
| Rear caliper adjuster locknut | 18 | 1.8 | 13.0 | |
| Rear caliper parking brake Allen bolts | 27 | 2.8 | 20 | L |
| Rear caliper shaft (Allen bolt) | 23 | 2.3 | 16.5 | ST |
| Rear caliper shaft, Caliper pad mounting bolts | 18 | 1.8 | 13.0 | |
| Front disc mounting bolts | 36 | 3.7 | 27 | |
| Rear disc mounting bolts | 23 | 2.3 | 16.5 | |
| Brake hose banjo bolts | 25 | 2.5 | 18.0 | |
| Brake lever pivot bolt | 5.9 | 0.6 | 52 in-lb | |
| Brake lever pivot bolt locknut | 5.9 | 0.6 | 52 in-lb | |
| Front master cylinder clamp bolts | 8.8 | 0.9 | 78 in-lb | |
| Rear master cylinder mounting bolts | 15 | 1.5 | 11.0 | |
| **Suspensions:** | | | | |
| Front shock absorber mounting nuts | 34 | 3.5 | 25 | |
| Suspension arm pivot bolts and nuts | 34 | 3.5 | 25 | |
| Rear shock absorber mounting nuts | 34 | 3.5 | 25 | |
| Rear shock oil hose banjo bolts | 29 | 3.0 | 22 | |
| Air valve (rear shock gas reservoir tank) | 12 | 1.2 | 104 in-lb | |
| Swing arm shaft nut | 78 | 8.0 | 58 | |
| Uni-Trak rocker arm nuts | 110 | 11.0 | 80 | |
| Uni-Trak tie-rod nuts | 110 | 11.0 | 80 | |
| **Steering:** | | | | |
| Handle bar clamp bolts | 21 | 2.1 | 15.0 | |
| Steering stem clamp Allen bolts and nuts | 20 | 2.0 | 14.5 | |
| Steering stem bottom end nut | 29 | 3.0 | 22 | |
| Steering knuckle $\phi$33 | 44 | 4.5 | 33 | |
| Steering knuckle joint nuts $\phi$10 | 41 | 4.2 | 30 | upper |
| Steering knuckle joint clamp nuts $\phi$10 | 41 | 4.2 | 30 | lower |
| Tie-rod end nuts (steering) | 41 | 4.2 | 30 | |
| Tie-rod adjusting sleeve locknuts (steering) | 27 | 2.8 | 20 | |
| **Frame:** | | | | |
| Rear frame lower mounting nuts | 42 | 4.3 | 31 | |
| Rear frame upper mounting bolts and nuts | 34 | 3.5 | 25 | early models |
| Rear frame upper mounting nuts | 42 | 4.3 | 31 | late models |
| Footpeg bracket bolts | 34 | 3.5 | 25 | |
| **Electrical System:** | | | | |
| Spark plug | 27 | 2.8 | 20 | |
| Headlight mounting screws | 3.9 | 0.4 | 35 in-lb | |

## Cable and Harness Routing

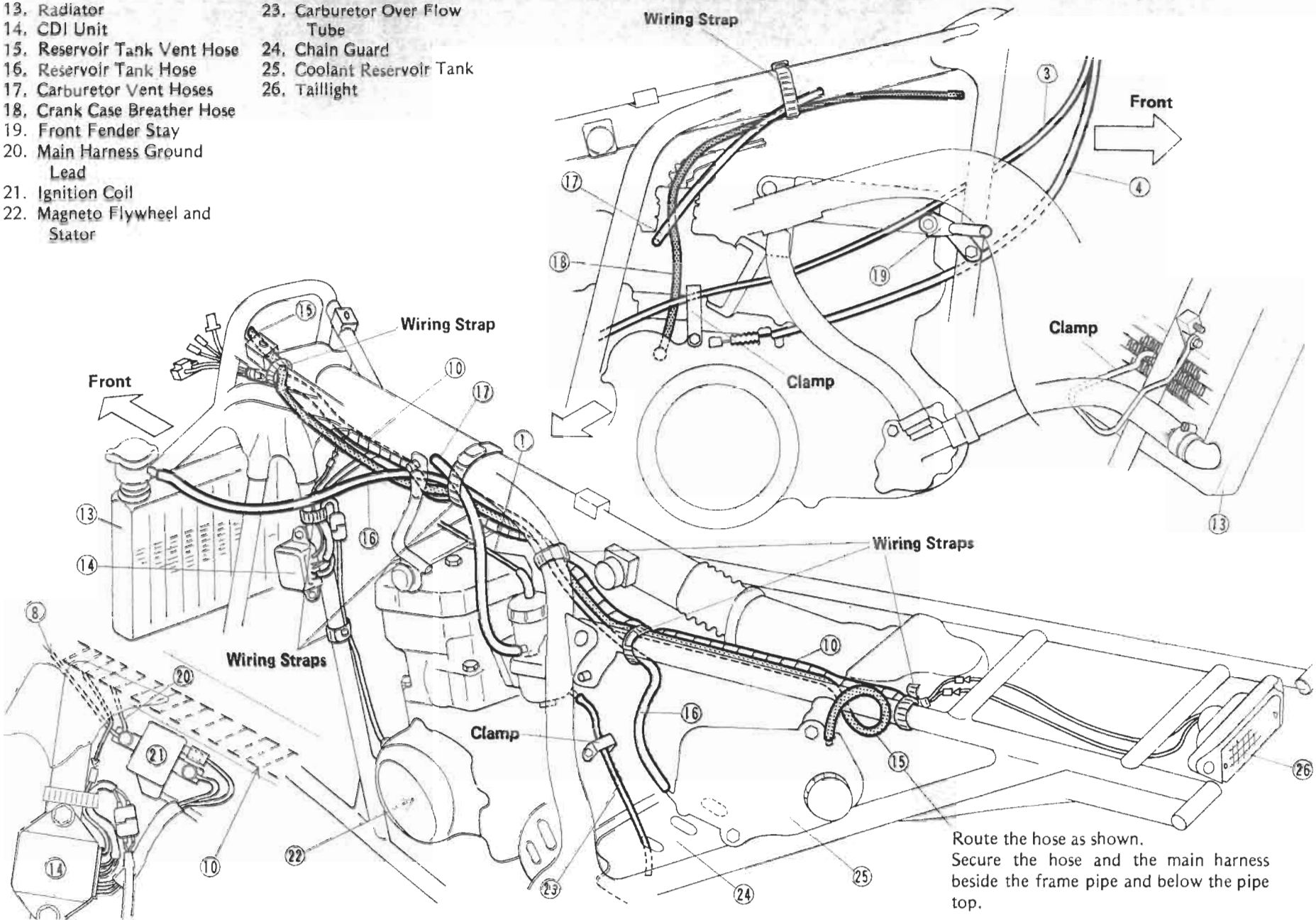



1. Throttle Cable
2. Fuel Tank Vent Hose
3. Parking Brake Cable
4. Clutch Cable
5. Brake Hoses
6. Ignition Switch
7. Headlight Connector
8. Engine Stop Switch Ground Lead (BK)
9. Engine Stop Switch and Headlight Switch Leads
10. Main Harness
11. Inlet Duct
12. Rear Master Cylinder

13. Radiator
14. CDI Unit
15. Reservoir Tank Vent Hose
16. Reservoir Tank Hose
17. Carburetor Vent Hoses
18. Crank Case Breather Hose
19. Front Fender Stay
20. Main Harness Ground Lead
21. Ignition Coil
22. Magneto Flywheel and Stator
23. Carburetor Over Flow Tube
24. Chain Guard
25. Coolant Reservoir Tank
26. Taillight




Route the hose as shown.
Secure the hose and the main harness beside the frame pipe and below the pipe top.

## Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the vehicle in good running condition.

| FREQUENCY / OPERATION | Daily | Every 10 hours | Every 20 hours | Every 30 hours | As required | See Page |
|---|---|---|---|---|---|---|
| Clutch – inspect* (lever free play) | ● | | | | | 5-10 |
| Throttle cable – inspect* (lever free play) | ● | | | | | 2-5 |
| Spark plug – clean, gap* | | | ● | | | 15-6 |
| Air cleaner element – clean | | ● | | | | 2-15 |
| Air cleaner element – replace | Every 5 cleanings | | | | | 2-15 |
| Carburetor – inspect/adjust* (idle speed) | ● | | | | | 2-7 |
| Transmission oil – change † | | | ● | | | 5-5 |
| Piston – clean/check* | | | ● | | | 4-10 |
| Piston ring – check* | | | ● | | | 4-11 |
| Cylinder – inspect* | | | ● | | | 4-10 |
| KIPS valve – check* | | | ● | | | 4-14 |
| Piston/cylinder clearance – inspect* | | | ● | | | 4-11 |
| Small end bearing – check* | | | ● | | | 4-12 |
| Big end bearing – check* | | | ● | | | 8-8 |
| Spark arrester – clean | | | | | year | 4-4 |
| Coolant – change | | | | | year | 3-4 |
| Radiator hoses, connections – check* | ● | | | | | 3-11 |
| Parking brake adjustment – check* | ● | | | | | 11-8 |
| Brake pad – check* | | | ● | | | 11-13 |
| Brake fluid level – check* | | ● | | | | 11-5 |
| Brake fluid – change | | | | | year | 11-6 |
| Drive chain – adjust | ● | | | | | 10-4 |
| Drive chain – lubricate | ● | | | | | 10-6 |
| Drive chain and sprockets – inspect* | | | ● | | | 10-5, 7 |
| Nuts, bolts, fasteners – check* | ● | | | | | 16-8 |
| Fuel system – clean | | | ● | | | 2-9 |
| Steering play – check* | | | ● | | | 13-7 |
| General lubrication – perform | ● | | | | | 16-6 |
| Uni-Trak bearing – grease | | | ● | | | 12-16 |
| Uni-Trak link, bearing wear – check* | | | ● | | | 12-16 |
| Uni-Trak arm, sleeve wear – check* | | | ● | | | 12-16 |
| Rear shock oil – replace | | | | ● | | 12-9 |
| Swing arm – lubricate | | | ● | | | 12-18 |
| Frame, swing arm – inspect for damage* | ● | | | | | 12-16 |
| Master cylinder cup and dust seal – replace | | | | | 2 years | 11-16 |
| Caliper piston seal and dust seal – replace | | | | | 2 years | 11-11 |
| Brake hose – replace | | | | | 2 years | 11-17 |
| Suspension arm bearing – grease | | | ● | | | 12-14 |
| Suspension arm bearing wear – check* | | | ● | | | 12-14 |
| Suspension arm bearing sleeve wear – check* | | | ● | | | 12-14 |
| Steering knuckle joint wear – check* | | | ● | | | 13-8 |
| Rear frame bolts and nuts tightness (lower) – check* | ● | | | | | 14-6 |
| Rear frame bolts and nuts tightness (upper) – check* | | ● | | | | 14-6 |
| Rear axle locknuts tightness – check* | | | ● | | | 10-7 |
| Chain guard bolts tightness – check* | ● | | | | | 10-6 |

* : Replace, add, adjust, clean, or torque if necessary.

† : Change transmission oil after first day. After that follow the regular schedule.

NOTE

○*Service more frequently when operated in mud, dust, or other harsh riding conditions.*

2

# Fuel System

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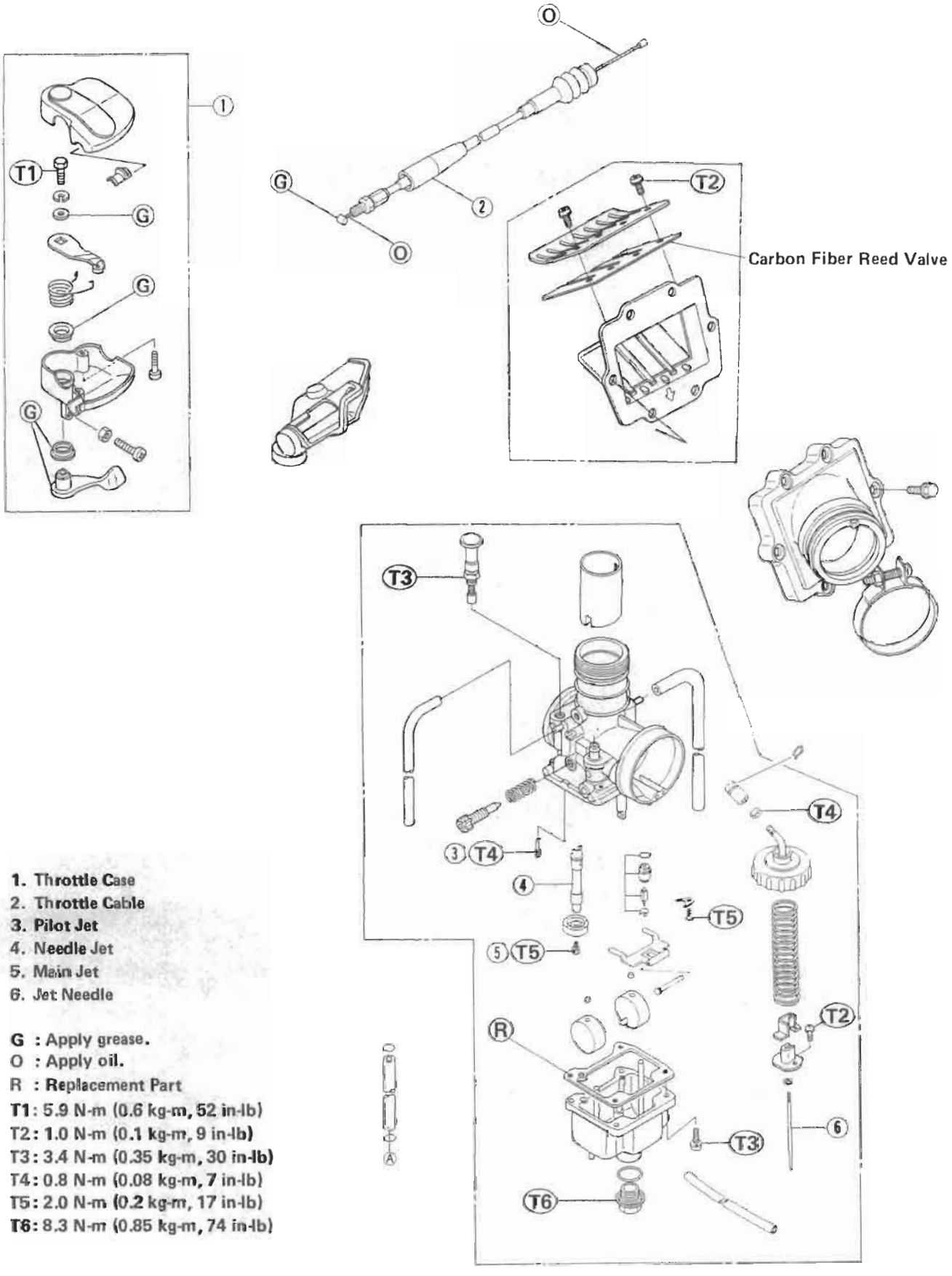
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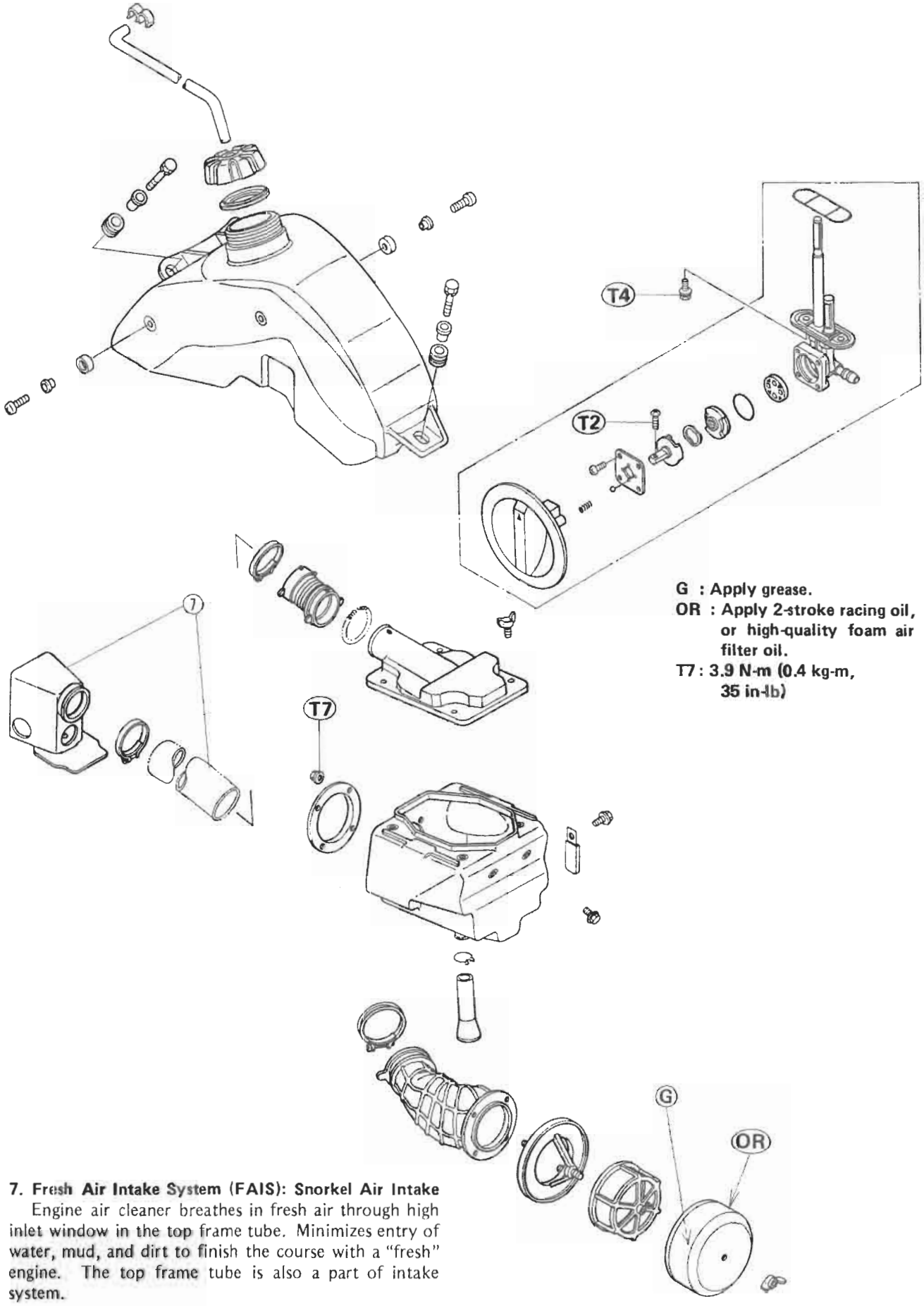
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## Exploded View




1. Throttle Case
2. Throttle Cable
3. Pilot Jet
4. Needle Jet
5. Main Jet
6. Jet Needle

**G** : Apply grease.
O : Apply oil.
R : Replacement Part
**T1**: 5.9 N-m (0.6 kg-m, 52 in-lb)
T2: 1.0 N-m (0.1 kg-m, 9 in-lb)
T3: 3.4 N-m (0.35 kg-m, 30 in-lb)
T4: 0.8 N-m (0.08 kg-m, 7 in-lb)
T5: 2.0 N-m (0.2 kg-m, 17 in-lb)
T6: 8.3 N-m (0.85 kg-m, 74 in-lb)




**G : Apply grease.**
**OR : Apply 2-stroke racing oil, or high-quality foam air filter oil.**
**T7 : 3.9 N-m (0.4 kg-m, 35 in-lb)**

**7. Fresh Air Intake System (FAIS): Snorkel Air Intake**

Engine air cleaner breathes in fresh air through high inlet window in the top frame tube. Minimizes entry of water, mud, and dirt to finish the course with a "fresh" engine. The top frame tube is also a part of intake system.

## Specifications

| | |
|---|---|
| **Throttle Lever Free Play** | |
| Standard: | 2 – 3 mm |
| **Idle Speed** | |
| Desired idle speed | |
| **Carburetor Specifications** | |
| Main jet: | #260 |
| Main air jet: | (ϕ2.5) |
| Needle jet: | Q-4 |
| Jet needle: | 6FL61-3 |
| Jet needle clip position: | 3rd groove from the top |
| Pilot jet (slow jet): | #30 |
| Pilot air jet (slow air jet): | (ϕ1.0) |
| Throttle valve cutaway: | (3 mm) |
| Starter jet: | (#100) |
| Service fuel level: | 1 ±1 mm below the bottom edge of carburetor body |
| Float arm height: | 17.1 ±2.0 mm |

( ) : for reference

| | |
|---|---|
| **Carburetor Optional Parts** | |
| Main Jet: | #240, 250, 270, 280 |
| Pilot Jet: | #25, 27.5, 35, 40, |
| Needle jet: | Q-0, Q-2, Q-6, Q-8 |

**Air Cleaner Element Oil**

2 stroke racing oil or high-quality foam-air-filter oil

**Reed Valve**

Reed warp service limit: 0.7 mm

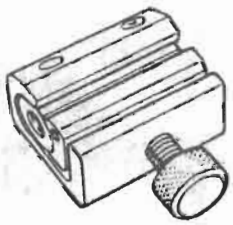
## Special Tools

Along with common hand tools, the following more specialized tools are required for complete fuel system servicing.

**Fuel Level Gauge 57001-202**



**Pressure Cable Luber: K56019-021**



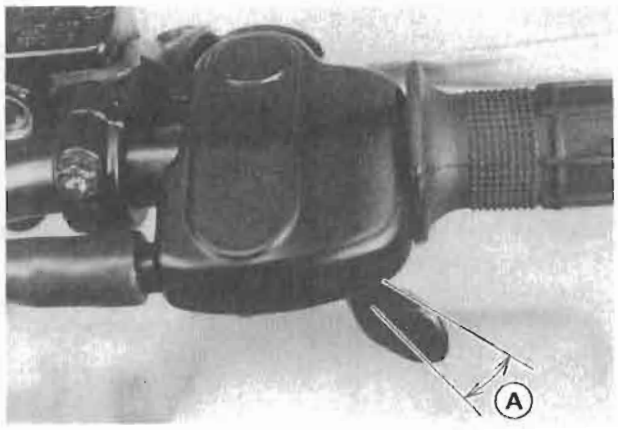
## Throttle Case and Cable

### *Throttle Lever Free Play Inspection*

- Check the throttle lever free play.
- ★If free play is not within the specification, adjust the throttle cable (see Throttle Lever Free Play Adjustment).

**Throttle Lever Free Play**

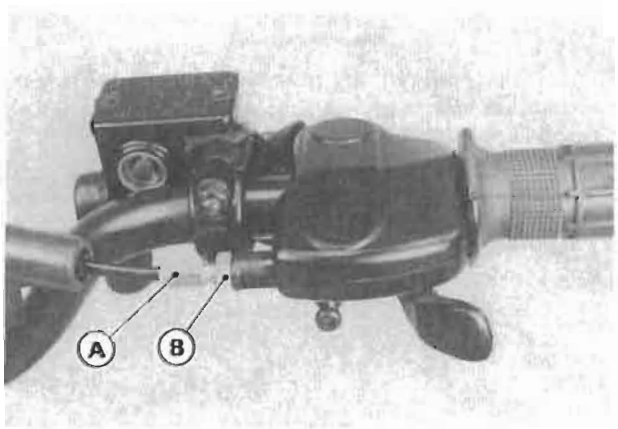
**Standard: 2 – 3 mm**




A. Throttle Lever Free Play

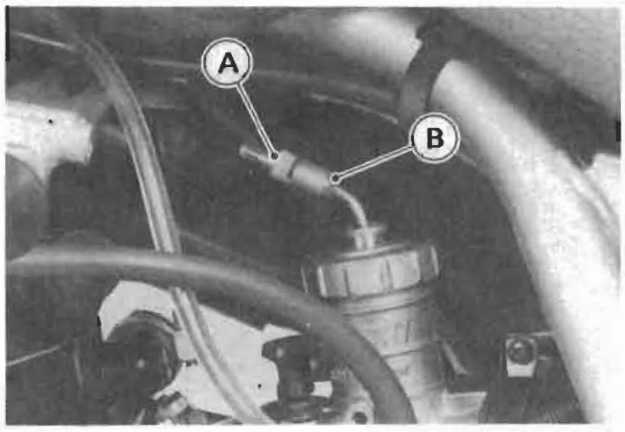
### *Throttle Lever Free Play Adjustment*

- Slide the rubber cover off the adjuster at the throttle case.
- Loosen the locknut and turn the throttle cable upper adjuster to obtain the specified free play.
- Tighten the locknut and reinstall the rubber cover.




A. Adjuster B. Locknut

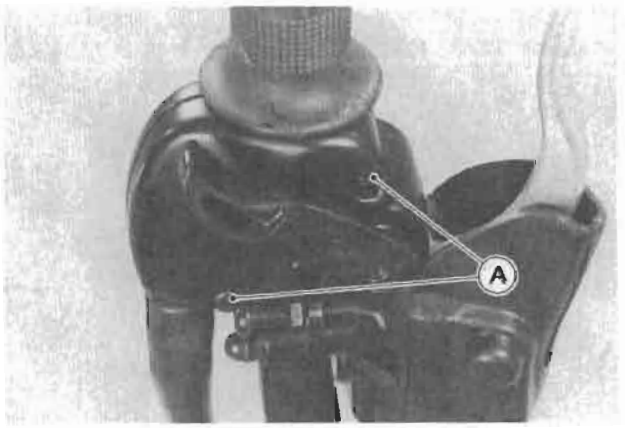
- If the free play cannot be set by adjusting the upper cable adjuster, pull the rubber cover off the carburetor top. Make the necessary free play adjustment at the lower cable adjuster, then tighten the locknut and reinstall the rubber cover.




A. Adjuster B. Locknut

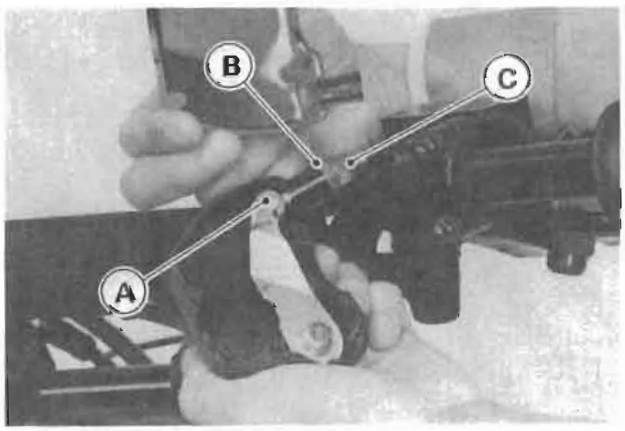
### *Throttle Case Removal/Disassembly*

- Pull the rubber cover off the carburetor top and the throttle case.
- Loosen the locknuts and screw in the upper and lower cable adjusters to give the cable plenty of play.
- Remove the throttle case screws and pull the case open.




A. Throttle Case Screws

- Pull the cable tip out of the throttle lever catch with the throttle lever opened.
- Loosen the locknut and unscrew the adjuster.

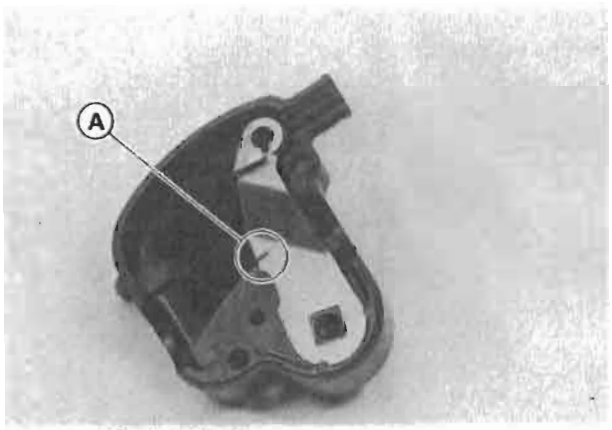



A. Cable Tip C. Adjuster
B. Locknut

- Disassemble the throttle case as follows.
  - Remove the throttle lever bolt, lockwasher, and flat washer. Lift the throttle lever and return spring from the case. The control lever pivot washers off with the lever.
  - Loosen the locknut and unscrew the throttle limiter screw.
  - Pull the throttle control lever out of the case.

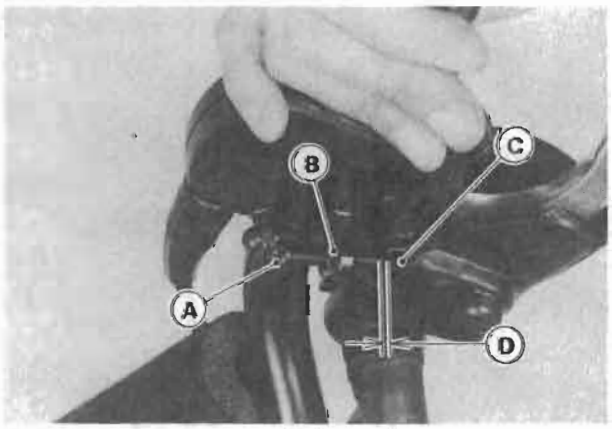
### *Throttle Case Assembly/Installation*

- Throttle case assembly/installation is the reverse of removal/disassembly. Note the following.
- Lubricate the throttle case and cable before assembly/installation (see Throttle Case and Cable Lubrication).
- Be certain that the return spring is correctly installed on the throttle lever.




A. Return Spring Hook

- Tighten the throttle lever bolt to the specified torque (see Exploded View).
- Swing the throttle control lever so that the carburetor throttle valve is fully open. Turn the throttle limiter screw until it is **spaced about 1 mm away** from the throttle lever stop.




A. Limiter Screw
B. Locknut
C. Lever Stop
D. 1 mm

**NOTE**

- *Refer to the Owner's Manual for the function of the throttle limiter and adjustment procedure.*

**WARNING**

- **Operation with an improperly assembled throttle case could result in an unsafe riding condition.**

- Adjust the throttle cable (see Throttle Lever Free Play Adjustment).

### *Throttle Cable Removal*

- Unscrew the carburetor top and free the lower end of the throttle cable from the carburetor top (see Carburetor Removal).
- Remove and disassemble the throttle case to free the upper end of the cable from the case (see Throttle Case Removal/Disassembly).
- Note the cable routing for proper installation, and pull the cable from the vehicle.
- Pull the cable out of the frame.

### *Throttle Cable Installation Notes*

- Throttle cable installation is the reverse of removal. Note the following.
- Lubricate the throttle cable before installation (see General Lubrication in the Appendix chapter).
- Route the cable correctly according to the Cable and Harness Routing section in the General Information chapter.

**WARNING**

- **Operation with an improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.**

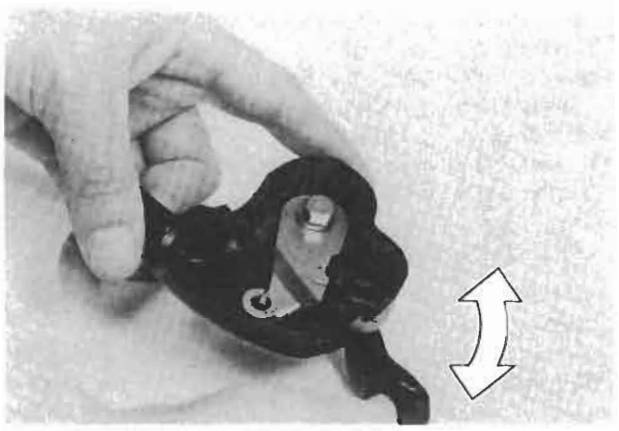
- Install the lower end of the cable in the carburetor top (see Carburetor Installation Notes).
- Adjust the throttle cable (see Throttle Lever Free Play Adjustment).

### *Throttle Case and Cable Lubrication*

- Lubricate the throttle case and cable in accordance with the Periodic Maintenance Chart (see General Information chapter and General Lubrication in the Appendix chapter).
  - Use the pressure cable luber (special tool: PN K56019-021) to lubricate the throttle cable.

*Throttle Case Inspection*

•With the throttle cable disconnected from the throttle lever, the lever should move freely and return smoothly by spring.



★If the lever feels heavy, disassemble the throttle case, clean and lubricate the throttle case (see General Lubrication in the Appendix chapter).

•Examine the lever and case for cracks. Replace the case assembly if it is cracked.

*Throttle Cable Inspection*

•With the throttle cable disconnected at both ends, the cable should move freely within the cable housing (see General Lubrication in the Appendix chapter).

## Carburetor

Inspect or adjust the carburetor in accordance with the Periodic Maintenance Chart (see General Information chapter).

*Carburetor Inspection (Idle Speed)*

•Throughly warm up the engine.

•With the engine idling, turn the handlebar to each side.

★If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of its conditions before riding.

**WARNING**

○**Operation with improperly adjusted, incorrectly routed or the damaged cable could result in an unsafe riding condition.**

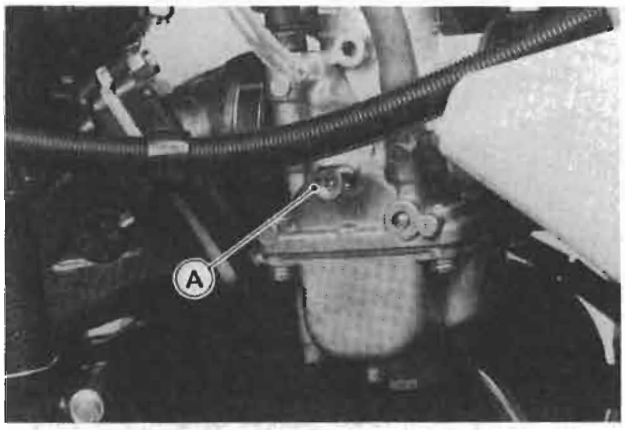
•Check that the idle speed is the desired one.

*Carburetor Adjustment*

•Start the engine and warm it up for five minutes.

•Turn the idle adjusting screw to obtain the desired idle speed.

•Open and close the throttle a few times to make sure that the idle speed does not change. Readjust the idle speed if necessary.




A. Idle Adjusting Screw

*Main Jet Replacement Notes*

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

○**Make sure the engine is cold before working. Wipe any fuel off the engine before starting it.**

•Turn the fuel tap to the OFF position.

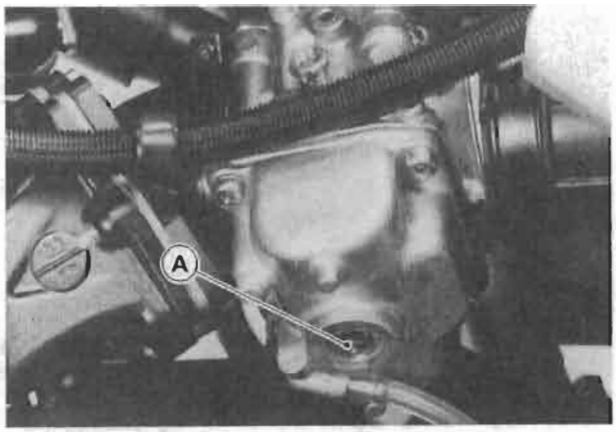
•Loosen the clamps on the carburetor holder and the air cleaner duct.

•Twist the carburetor so that the bottom is outboard.

•Place a suitable container beneath the carburetor drain plug.

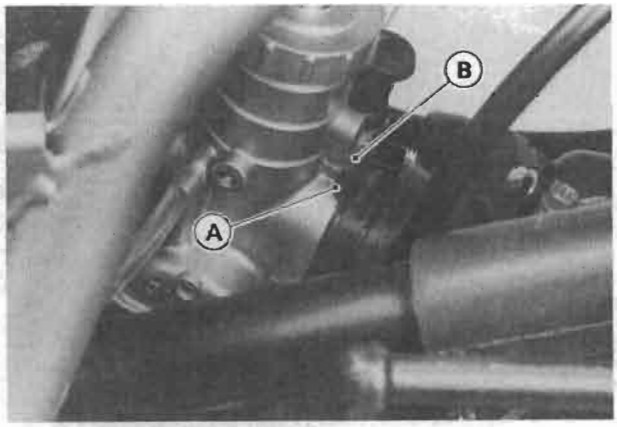
•Remove the drain plug to drain the carburetor.

•Replace the main jet with the desired one.




A. Main Jet

- Tighten the main jet and drain plug to the specified torque (see Exploded View).
- Twist the carburetor back so that the ridge contacts the stopper on the duct.




A. Stopper B. Ridge

*Service Fuel Level Inspection*

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

○**Make sure the engine is cold before working. Wipe any fuel off the engine before staring it.**

- Close the fuel tap, and remove the carburetor. The fuel hose and carburetor cable do not have to be removed to inspect the fuel level.
- Remove the drain plug from the bottom of the float bowl, and screw a fuel level gauge (special tool) into the plug hole.
- Open the fuel tap so that fuel will flow into the carburetor.
- Line up the uppermost part of the ruled portion of the gauge hose with the bottom edge of the carburetor.
- Wait until the fuel in the gauge settles.

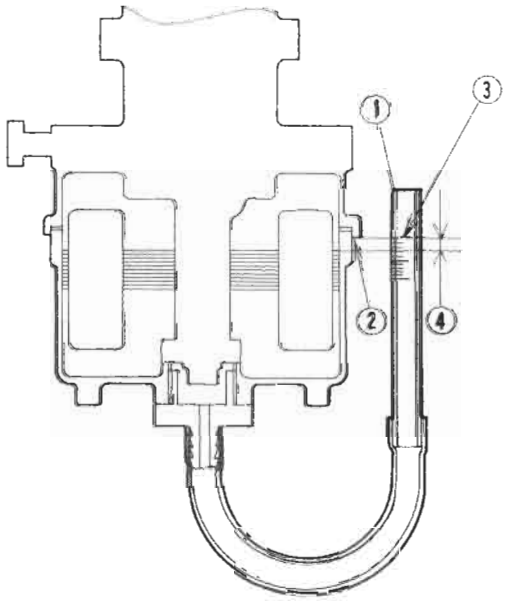
★If the fuel does not appear or overflow, inspect the float and float valve.

**NOTE**

○*Measure the fuel level, keeping the carburetor perpendicular to the ground.*

○*Do not lower the top of the ruled portion below the bottom edge of the carburetor body. If the gauge is lowered and then raised again, the fuel level measured shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of the gauge into a suitable container and start the procedure over again.*

**Service Fuel Level Measurement**




1. Fuel Level Gauge: 57001-202
2. Carburetor Body Bottom Edge
3. Top of Ruled Portion
4. Fuel Level

- Read the fuel level in the gauge and compare it to the specification.

★If the fuel level is incorrect, adjust it (see Fuel Level Adjustment).

**Fuel Level**

**1 ±1 mm bellow the bottom edge of the carburetor body**

*Service Fuel Level Adjustment*

- Remove the carburetor.
- Remove the float bowl from the carburetor.
- Check the float arm height.

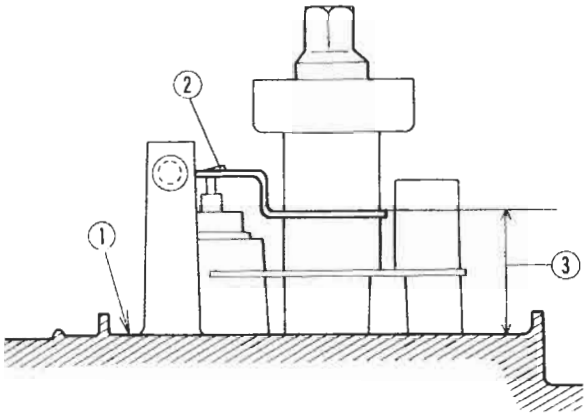
**Float Arm Height**

**Standard: 17.1 ±2.0 mm**

**NOTE**

○*Float arm height is the distance from the float bowl mating surface of the carburetor body (with the gasket removed) to the upper side of the float arm. Measure the height with the carburetor upside down.*

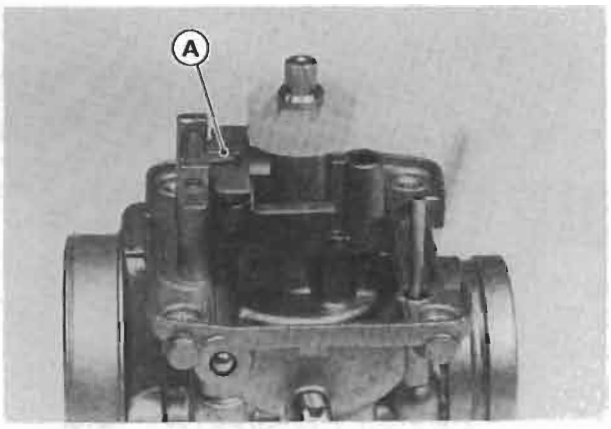
**Float Arm Height Measurement**




1. Float Bowl Mating Surface
2. Float Arm Tang
3. Float Arm Height

★If the float arm height is not within the specification, bend the tang on the float arm a very slight amount to change the float arm height.

○Increasing the float arm height lowers the fuel level, and decreasing the float arm height raises the fuel level.




A. Tang

- After adjustment, assemble the carburetor and check the service fuel level again.

★Readjust the service fuel level if necessary. If the service fuel level cannot be corrected within the specified range by adjusting the float arm height, the float and/or float valve may be damaged necessitating float and/or valve replacement.

*Fuel System Cleanliness Inspection*

Accumulation of moisture or sediment in the fuel system will restrict the flow of fuel and cause carburetor malfunction. The system should be checked in accordance with the Periodic Maintenance Chart.

**WARNING**

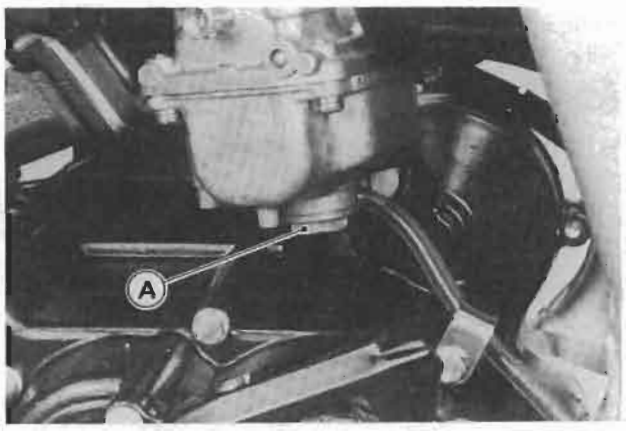
○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

○**Make sure the engine is cold before working. Wipe any fuel off the engine before starting it.**

- Turn the fuel tap to the OFF position.
- Loosen the clamps on the carburetor holder and the air cleaner duct.
- Twist the carburetor so that the bottom is outboard.
- Place a suitable container beneath the carburetor drain plug.
- Remove the drain plug to drain the carburetor, and check to see if water or dirt has accumulated in the carburetor.

★If any water or dirt appeared during the above inspection, clean the fuel system (see Carburetor Cleaning, Fuel Tank and Tap Cleaning).

- Tighten the drain plug to the specified torque (see Exploded View).




A. Drain Plug

- Twist the carburetor back so that the ridge contacts the stopper on the duct.

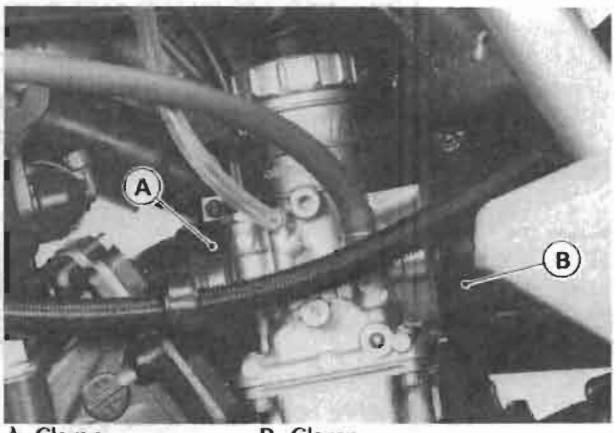
*Carburetor Removal*

- Remove the following parts.
  Right and Left Side Covers
  Vent Hose Ends on Carburetor
- Turn the fuel tap to the OFF position to stop the fuel flow.
- Pull the fuel hose off the carburetor.

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

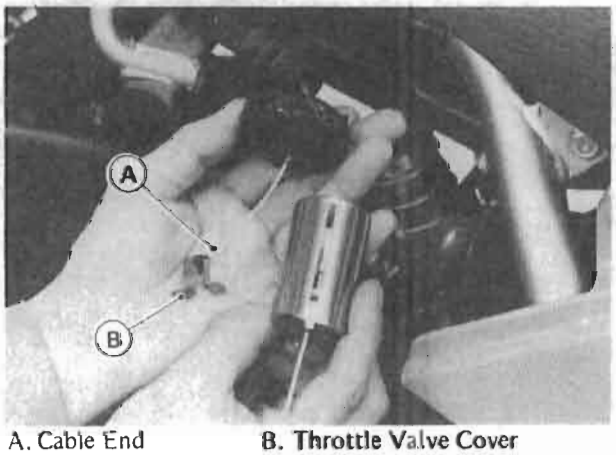
- Loosen the clamps on the carburetor holder and the air cleaner duct.




A. Clamp B. Clamp

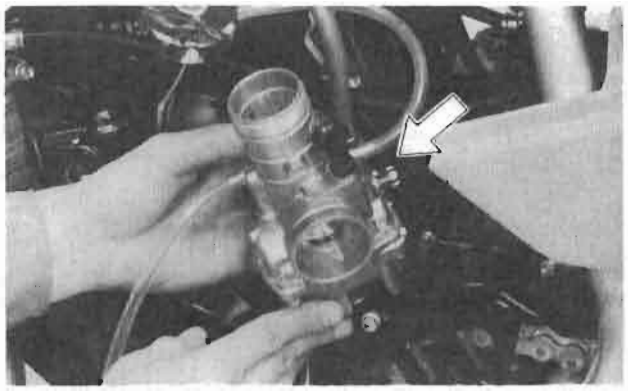
- Twist the carburetor so that the top is outboard.
- Screw in the upper and lower throttle cable adjusters to give the cable plenty of play.
- Unscrew the carburetor top and pull out the throttle valve.
- Hold the throttle valve spring compressed, take out the throttle valve cover, and free the throttle cable by sliding it through the slot.

○One way to hold the spring is by taping the spring on the carburetor top.




A. Cable End B. Throttle Valve Cover

- Pull the cable from the carburetor top.
- Pull the carburetor out of the carburetor holder and the air cleaner duct.

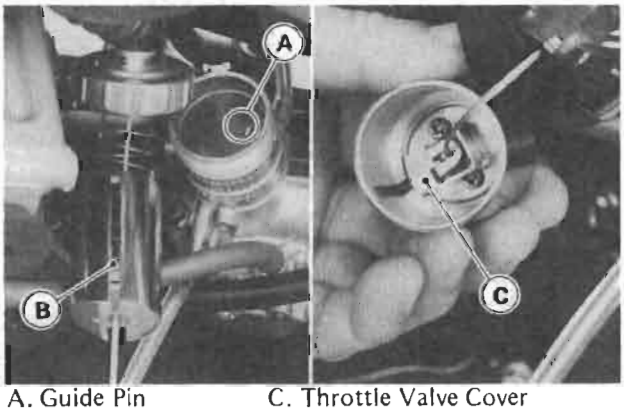


*Carburetor Installation Notes*

○Carburetor installation is the reverse of removal. Note the following.

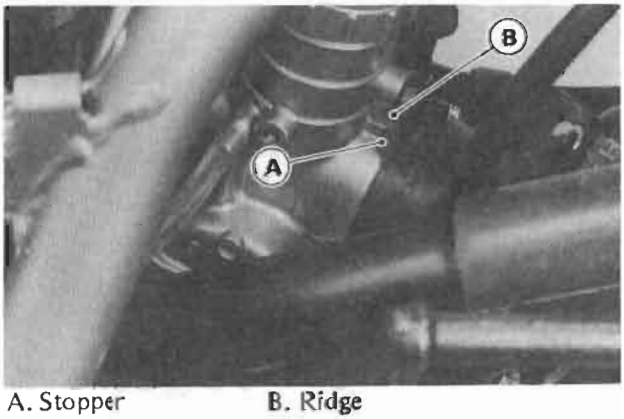
- Being careful not to bend or otherwise damage the jet needle, align the groove on the side of the throttle valve with the guide pin in the carburetor body.

○Check to see that the throttle valve goes all the way down into the carburetor body, and slides smoothly.




A. Guide Pin C. Throttle Valve Cover
B. Groove

- Tighten the carburetor top securely by hand.
- Install the carburetor so that the ridge contacts the stopper on the duct.




A. Stopper B. Ridge

•Run the throttle cable, over flow hose, and vent hoses according to the Cable and Harness Routing section in the General Information chapter.
•Check the fuel leakage from the carburetor.

**WARNING**

○**Fuel spilled from the carburetor is hazardous.**

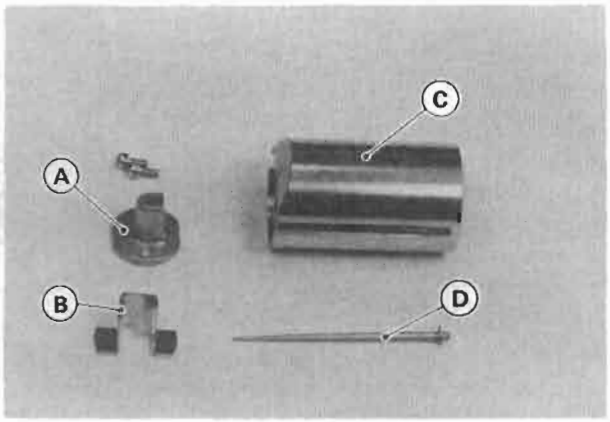
**CAUTION**

○**Do not let these hoses become folded, pinched, or melted by the exhaust system. Unvented hoses will prevent the vehicle from operating properly.**

•If the carburetor has been disassembled, or if there is some other reason that the fuel level may be incorrect, inspect the fuel level (see Service Fuel Level Inspection).
•Adjust the idle speed (see Carburetor Adjustment).
•Adjust the throttle cable (see Throttle Lever Free Play Adjustment).

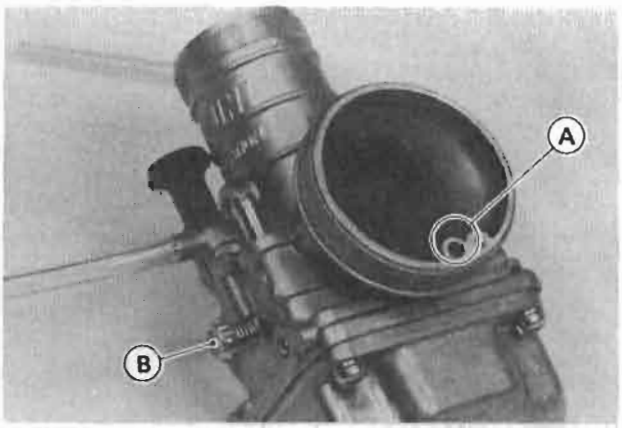
*Carburetor Disassembly*

•Remove the carburetor (see Carburetor Removal).
•Remove the throttle cable connector by removing the screws.
•Slide the jet needle out of the throttle valve from the bottom. Do not remove the clip from the needle.



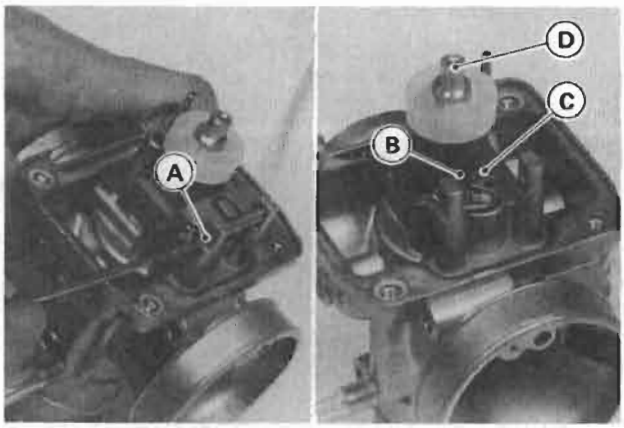

A. Throttle Cable Connector
B. Throttle Valve Cover
C. Throttle Valve
D. Jet Needle

•Unscrew the idle adjusting screw and remove it with its spring.



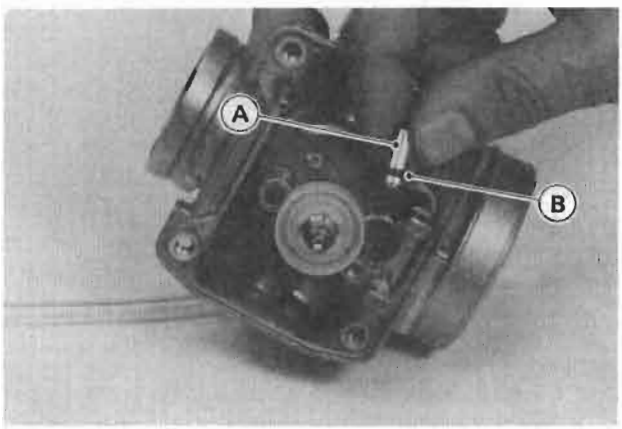

A. Main Air Jet B. Idle Adjusting Screw

•Remove the float bowl screws and take off the float bowl.
•Drive out the pivot pin and remove the float arm.
•Slide out the retainer spring and drop out the float valve.



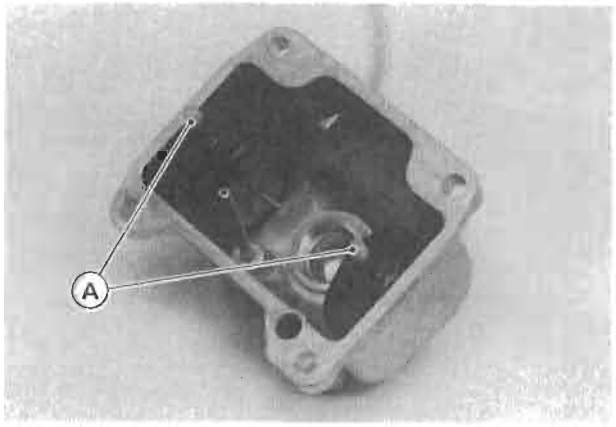

A. Drive out the Pin. C. Float Valve
B. Retainer Spring D. Main Jet

•Pull out the float valve seat after removing the valve retainer.



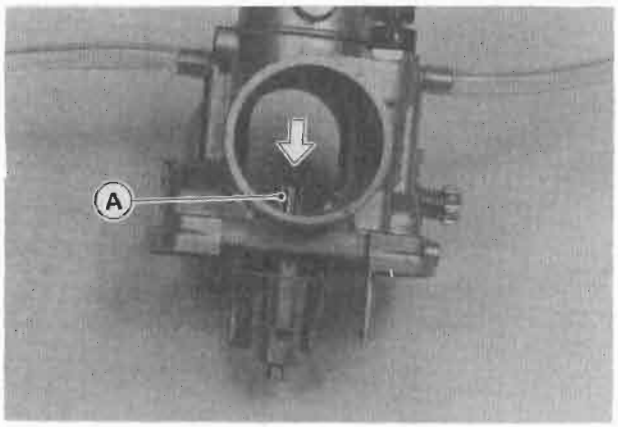

A. Valve Seat B. O-Ring

•Pull out the float caps and remove the floats. Discard the float caps.




A. Float Caps

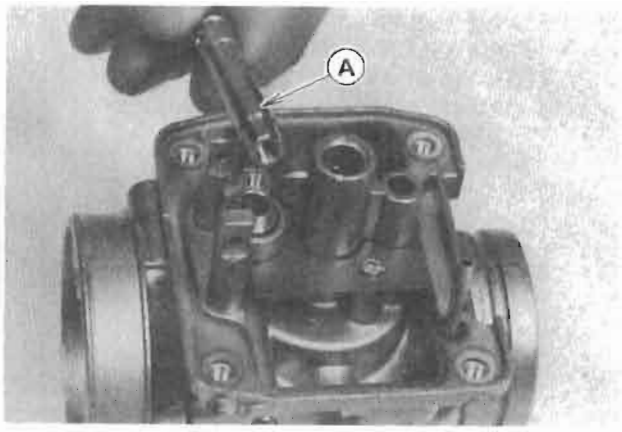
•Unscrew the main jet and pilot jet.
•Push the needle jet out from the inside of the carburetor with your finger.




A. Needle Jet

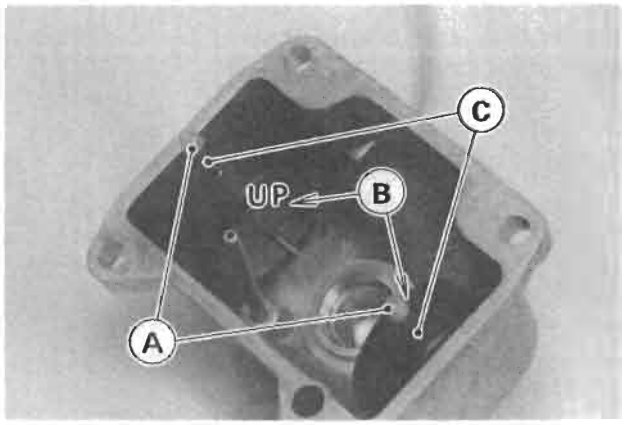
*Carburetor Assembly Notes*

•Carburetor assembly is the reverse of disassembly. Note the following.
•Turn the carburetor body upside-down, and drop the needle jet as shown.
•Fit the slot in the needle jet over the guide in the carburetor body. The notch should face toward the engine side.




A. Slot in Needle Jet

•Insert the floats onto the guides so that the UP marks face toward the float bowl.
•Put the new float caps on the guides.



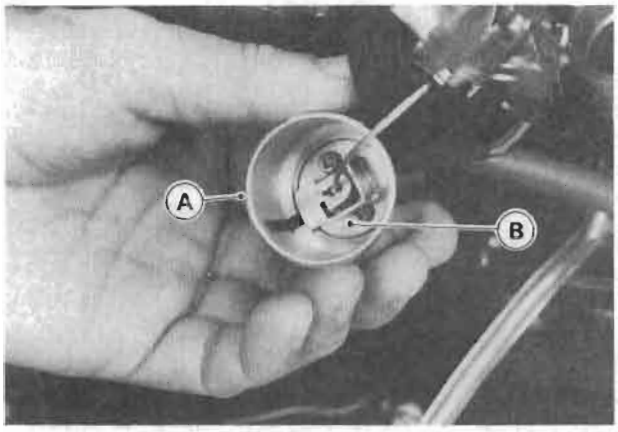

A. Float Caps
B. UP Marks
C. Guides

•Check the float arm height (see Service Fuel Level Adjustment).

**WARNING**

**•If the float arm height is improperly adjusted, the specified fuel level cannot be maintained. Fuel spilled from the carburetor is hazardous.**

•Install the new gasket on the float bowl.
•If the jet needle clip was removed, install it in the groove specified (see Specifications).
•Slip the needle through the hole in the center of the throttle valve and install the cable connector.




A. Throttle Valve B. Throttle Cable Connector

*Carburetor Cleaning*

CAUTION

○**Do not use compressed air on an assembled carburetor, or the float arm may be deformed by the pressure.**
○**Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of the parts.**
○**The carburetor has plastic parts that are difficult to remove. DO NOT use a strong carburetor cleaning solution which could attack these parts; instead, use a mild cleaning solution safe for plastic parts.**
○**Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.**

- Disassemble the carburetor (see Carburetor Disassembly).
- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow the air and fuel passages with compressed air.
- Assemble the carburetor (see Carburetor Assembly).

*Carburetor Inspection*

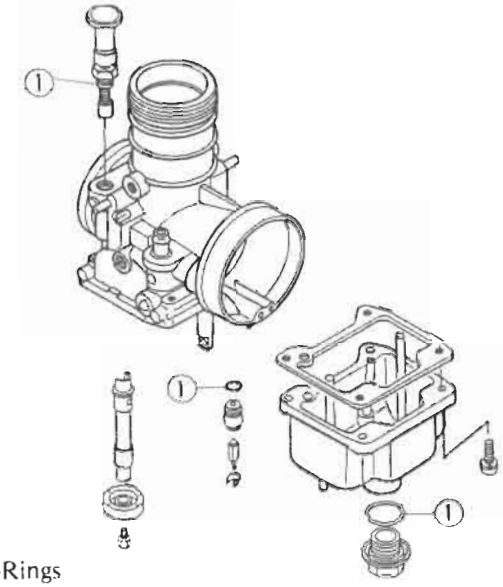
- Before removing the carburetor, check the fuel level (see Service Fuel Level Inspection).

★If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.

- Remove the carburetor (see Carburetor Removal).
- Move the starter plunger up and down to check that the plunger moves smoothly.

★If the starter plunger does not work properly, replace the plunger.

- Disassemble the carburetor (see Carburetor Disassembly).
- Clean the carburetor (see Carburetor Cleaning).
- Check that the O-rings on the drain plug, starter plunger and the float valve seat are in good condition.




1. O-Rings

★If any of the O-rings are not in good condition, replace them.

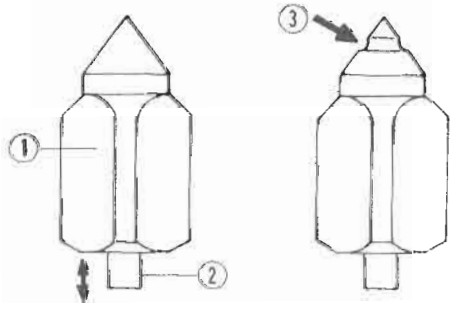
- Check the float valve needle and valve seat for wear.

★If the needle is worn as shown in the figure or the seat is worn, replace the valve and valve seat as a set.

- Push the rod in the valve, then release it.

★If the rod does not spring out, replace the valve and valve seat as a set.

**Float Valve Inspection**




Good Bad

1. Float Valve
2. Rod
3. Valve Needle Wear

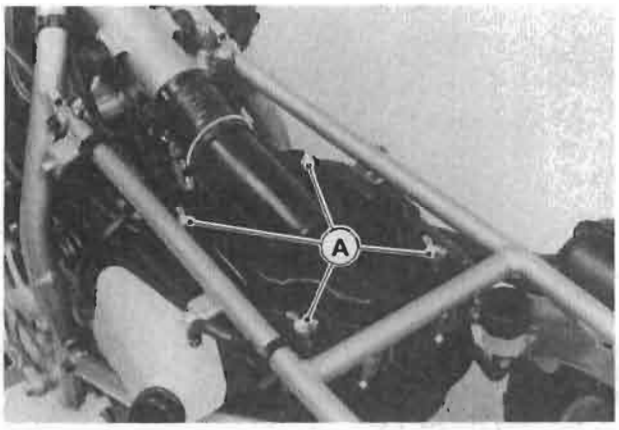
- Check that the throttle valve moves smoothly in the carburetor body. The surface of the slide must not be excessively worn.

★If the throttle valve does not move smoothly, or if it is very loose in the carburetor body, replace both the body and the throttle valve.

## Air Cleaner

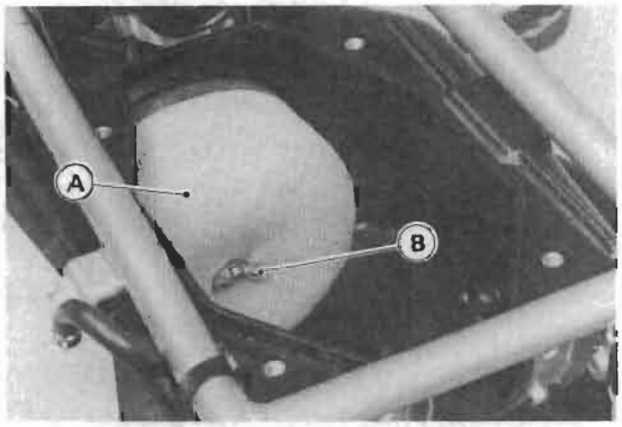
### *Air Cleaner Element Removal*

- Remove the rear fender and seat (see Frame chapter).
- Remove the air cleaner cover after taking off the wing bolts.




A. Wing Bolts

- Unscrew the wing nut and take out the air cleaner element.




A. Element B. Wing Nut

- After removing the element, stuff pieces of lint-free, clean cloths into the intake ducts to keep the dirt out of the engine.

**WARNING**

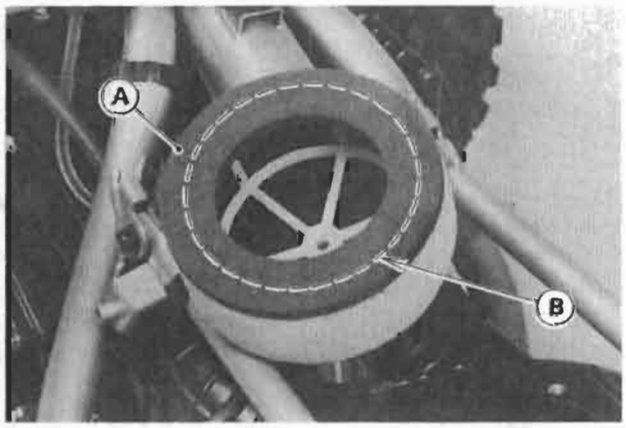
**○If dirt or dust is allowed to pass through into the carburetor, the throttle may become stuck, possibly causing an accident.**

**CAUTION**

**○If dirt or dust gets through into the engine, excessive engine wear and possibly engine damage will occur.**

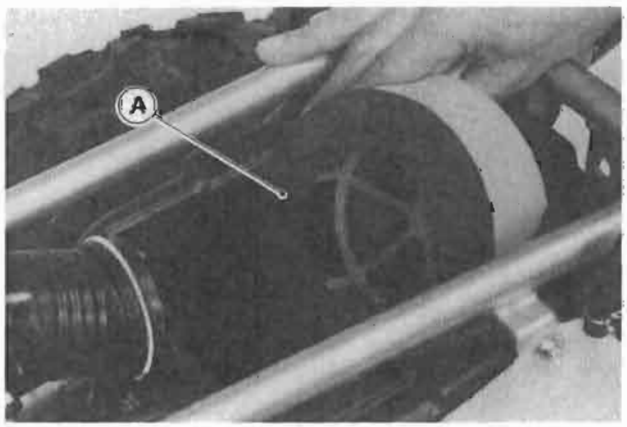
### *Air Cleaner Element Installation*

- Element installation is the reverse of removal. Note the following.
- Be sure that the element is over the frame.
- Coat the foam gasket with a thick layer of all purpose grease to assure a complete seal against the air cleaner housing.
- Also, coat the air cleaner housing where the lip of the element fits.




A. Foam Gasket B. Grease

- Slide the air cleaner element into place with the foam gasket toward the engine.




A. Foam Gasket

- Tighten the wing nut and bolts finger tight.

*Air Cleaner Element Cleaning and Replacement*

A clogged air cleaner restricts the engine's air intake, increasing fuel consumption, reducing engine power, and causing spark plug fouling.

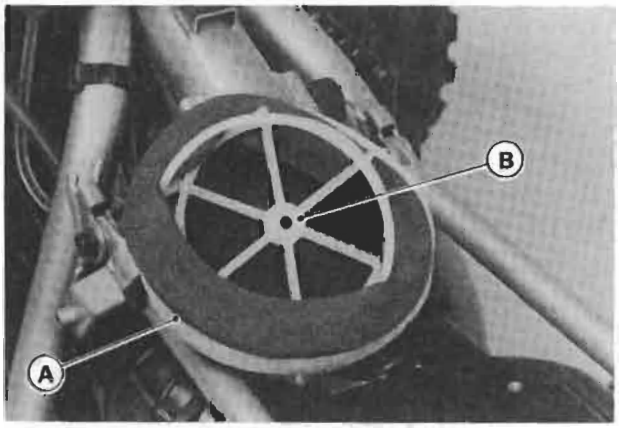
**CAUTION**

**○A clogged air cleaner may allow dirt or dust to enter the engine causing excessive wear and possibly engine damage.**

**WARNING**

**○A clogged air cleaner may allow dirt or dust to enter the carburetor and stick the throttle open. This could cause an accident.**

- Remove the air cleaner element (see Air Cleaner Element Removal).
- Peel the air cleaner element off the plastic frame.




A. Element B. Frame

**WARNING**

**○Clean the element in a well-ventilated area, and take care that there is no spark or flame near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents to clean the element.**

**NOTE**

*○Replace the element after cleaning it five times or if the element is damaged.*

- Wash the element in a bath of high-flash point solvent and then squeeze it dry.

**CAUTION**

**○Do not wring or twist the element as it may tear.**

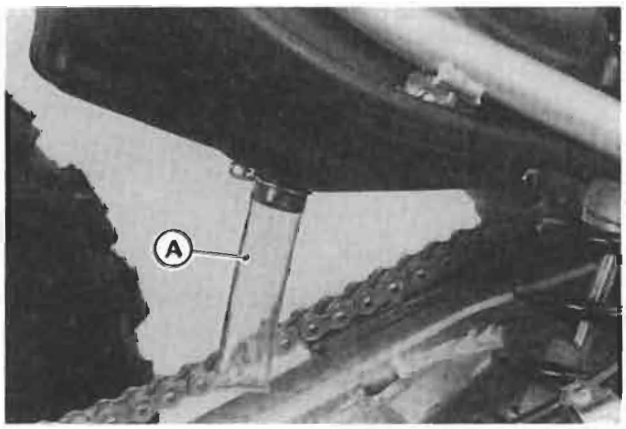
- After cleaning, saturate the element with **2-stroke racing oil or high-quality foam-air-filter oil,** squeeze out the excess oil, then wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the element.
- Inspect the element and the sponge gasket on the air cleaner cover for damage. If either is damaged, replace it, or it will allow dirt or dust into the carburetor.

**WARNING**

**○If dirt or dust is allowed to pass through into the carburetor, the throttle may become stuck, possibly causing an accident.**

*Air Cleaner Housing Dust and/or Water Inspection*

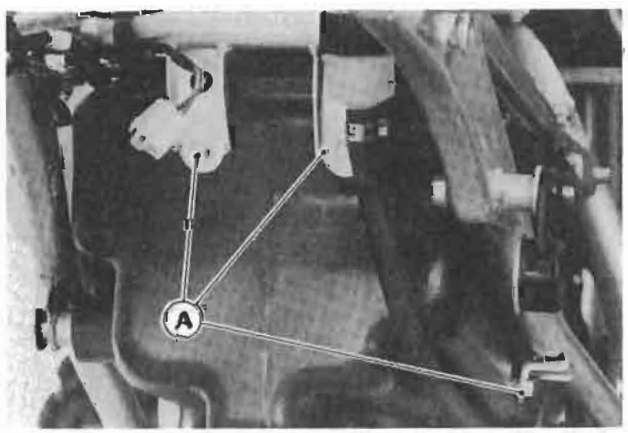
- Remove the drain hose shown to expel dust and/or water accumulated inside.




A. Drain Hose

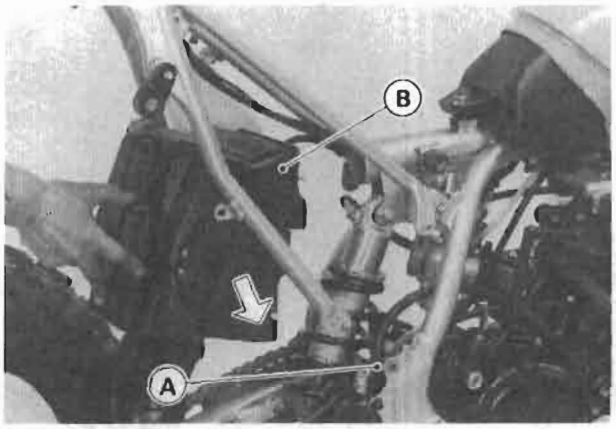
*Air Cleaner Housing Removal*

- Remove the following parts.
  - Rear Fender and Seat (see Frame chapter)
  - Rear Muffler (see Engine Top End chapter)
  - Air Cleaner Housing Mounting Bolts
  - Rear Brake Oil Reservoir
  - Rear Frame Mounting Bolts and Nuts (lower)




A. Bolts

- Loosen the air cleaner duct clamp screws.
- Tilt up the rear frame and take out the air cleaner housing.




A. Rear Frame Mounting Bolts and Nuts
B. Air Cleaner Housing

- Push a clean, lint-free towel into the air cleaner housing and the carburetor opening to keep dirt or other foreign material from entering.

**WARNING**

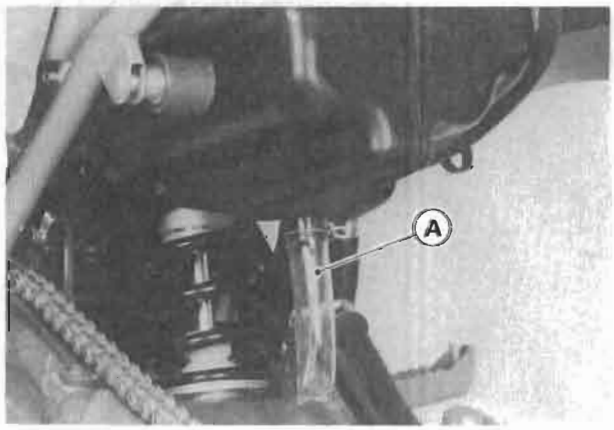
**If dirt or dust is allowed to pass through into the carburetor, the throttle may become stuck open, possibly causing an accident.**

**CAUTION**

**If dirt or dust gets through into the engine, excessive engine wear and possibly engine damage will occur.**

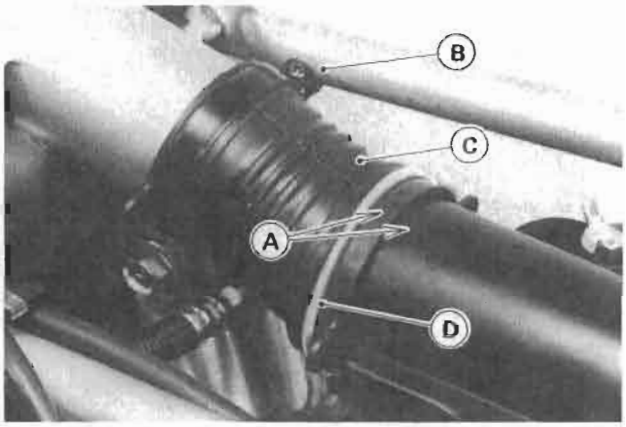
### *Air Cleaner Housing Installation Notes*

- Air cleaner housing installation is the reverse of removal. Note the following.
- If the drain hose was removed, twist it into place on the bottom of the air cleaner.




A. Drain Hose

- Be sure to tighten all the rear frame mounting bolts and nuts to the specified torque (see Exploded View in the Frame chapter).
- Install the upper air cleaner duct by aligning the location marks. Be sure to tighten the duct clamp and install the spring band in place.




A. Location Marks
B. Clamp
C. Upper Air Cleaner Duct
D. Spring Band

## Fuel Tank

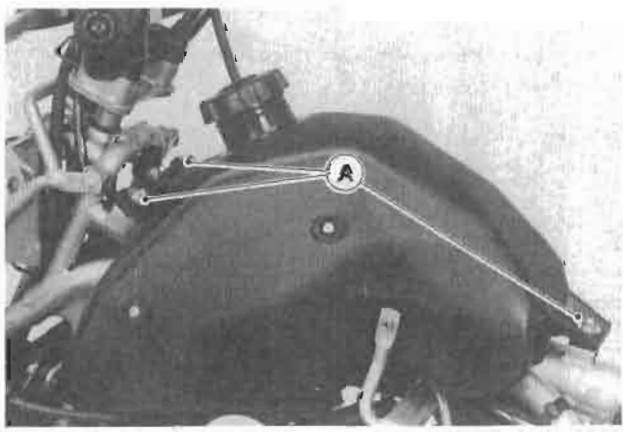
### *Fuel Tank Removal*

- Remove the front fender (see Frame chapter).

**WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

- Turn the fuel tap to the OFF position.
- Pull the fuel hose off the tap.
- Remove the bolts shown.




A. Bolts and Dampers

- Remove the fuel tank.
- Turn the fuel tap ON and drain the fuel into a suitable container.

### *Fuel Tank Installation Notes*

- Fuel tank installation is the reverse of removal. Note the following.

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

- Check the rubber dampers in the tank mounting holes.
- ★If the dampers are damaged or deteriorated, replace them.
- Be sure the fuel hose is clamped to the fuel tap and carburetor to prevent leaks.

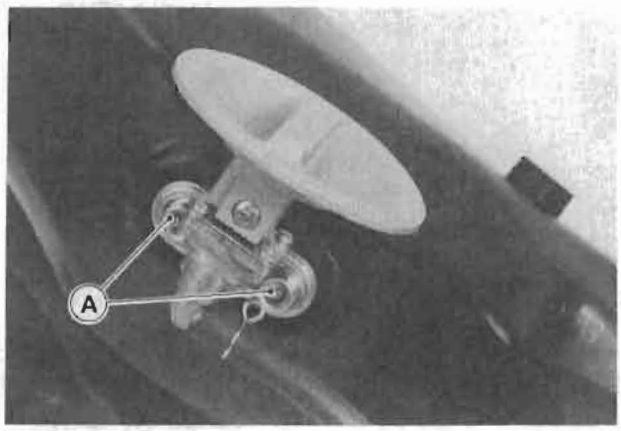
**WARNING**

○**Fuel spilled from the fuel tap is hazardous.**

- Run the fuel tank vent hose according to the Cable and Harness Routing section in the General Information chapter.

### *Fuel Tap Removal*

- Remove the fuel tank and drain it (see Fuel Tank Removal).
- Remove the bolts and take out the fuel tap.




A. Bolts

### *Fuel Tap Installation*

- Fuel tap installation is the reverse of removal. Note the following.
- Be sure the O-ring is in good condition to prevent leaks.
- Be sure to clamp the fuel hose to the tap to prevent leaks.

**WARNING**

○**Fuel spilled from the fuel tap is hazardous.**

### *Fuel Tank and Tap Cleaning*

- Remove the fuel tank and drain it (see Fuel Tank Removal).
- Pour some high-flash point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.

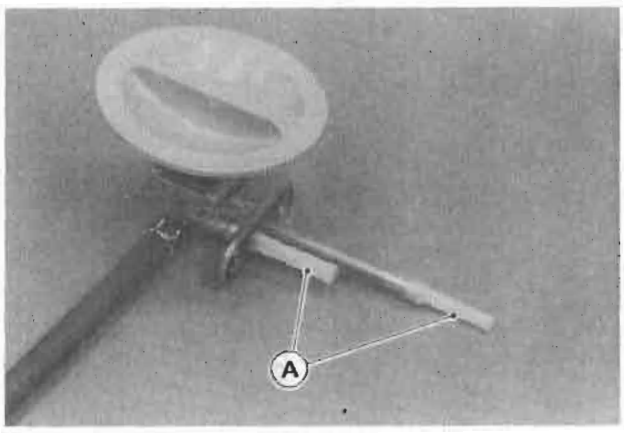
**WARNING**

○**Clean the tank in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents to clean the tank.**

- Pour the solvent out the tank.
- Remove the fuel tap from the tank by taking out the bolts.
- Clean the fuel tap filter screens in high-flash point solvent.
- Pour high-flash point solvent through the tap in both ON and RES positions.
- Dry the tank and tap with compressed air.
- Install the tap in the tank (see Fuel Tap Installation).
- Install the fuel tank (see Fuel Tank Installation).

### *Fuel Tap Inspection*

- Remove the fuel tap (see Fuel Tap Removal).
- Check the fuel tap filter screens for any breaks or deterioration.




A. Screens

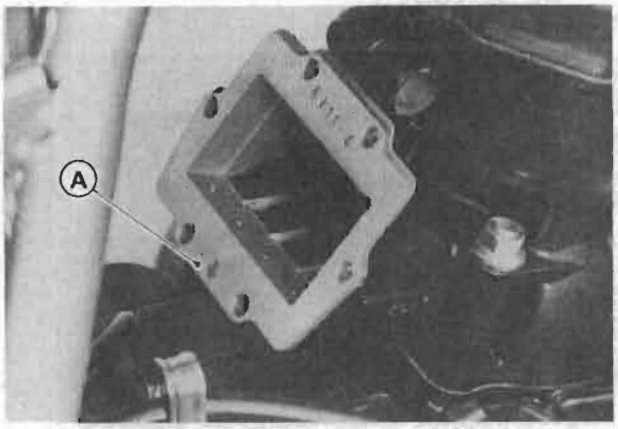
★If the fuel tap screens have any breaks or are deteriorated, it may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.
★If the fuel tap leaks, or allows fuel to flow when it is OFF, replace it.

## Reed Valve

*Reed Valve Installation Notes*

**NOTE**

○*When Installing the reed valve on the cylinder, the arrow on the reed valve must point to the downward as shown.*




A. Arrow

●Install a new gasket for the reed valve assembly on the cylinder.

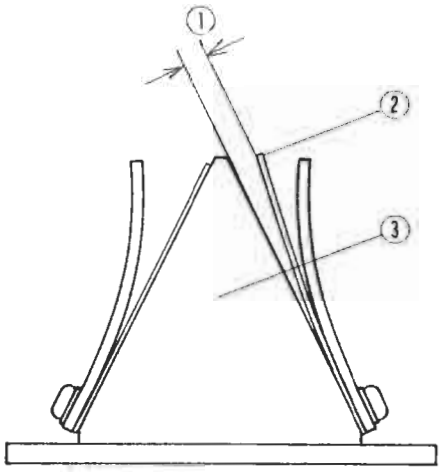
*Reed Valve Inspection*

●Check reed warp by measuring the clearance between each reed and the valve holder as shown.
★If any one of the clearance measurements exceeds the service limit, replace the reed valve assembly with a new one.

**Reed Warp**

| | |
|---|---|
| Service Limit | 0.7 mm |

**Reed Warp**




1. Clearance
2. Reed
3. Reed Valve Holder

●Visually inspect the reeds for cracks, folds, or other damage.
★If there is any doubt as to the condition of a reed, replace the reed valve assembly.
★If a reed becomes wavy, replace the reed valve assembly with a new one even if its warp is less than the service limit.

# Cooling System

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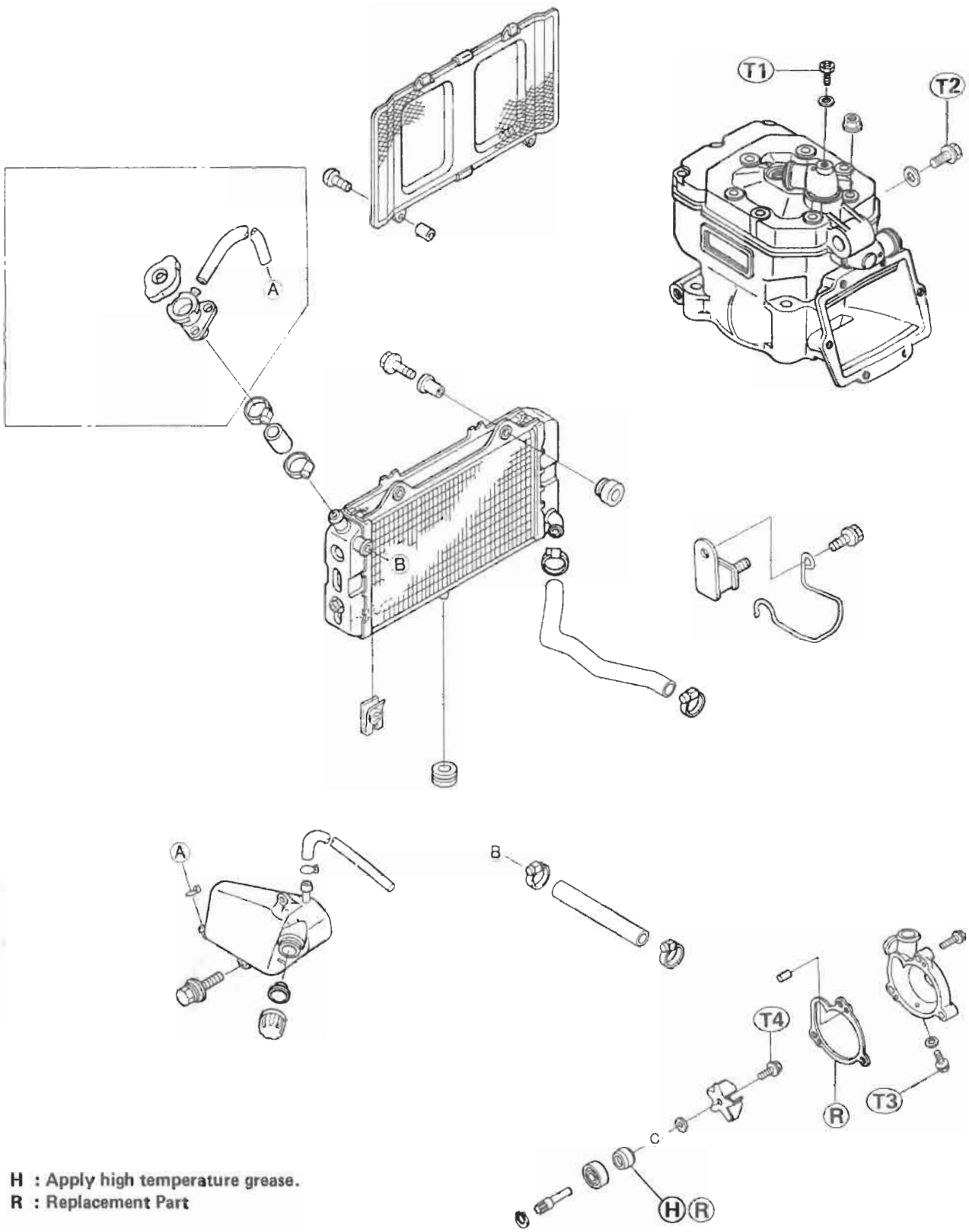

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## 3-2 COOLING SYSTEM

### Exploded View



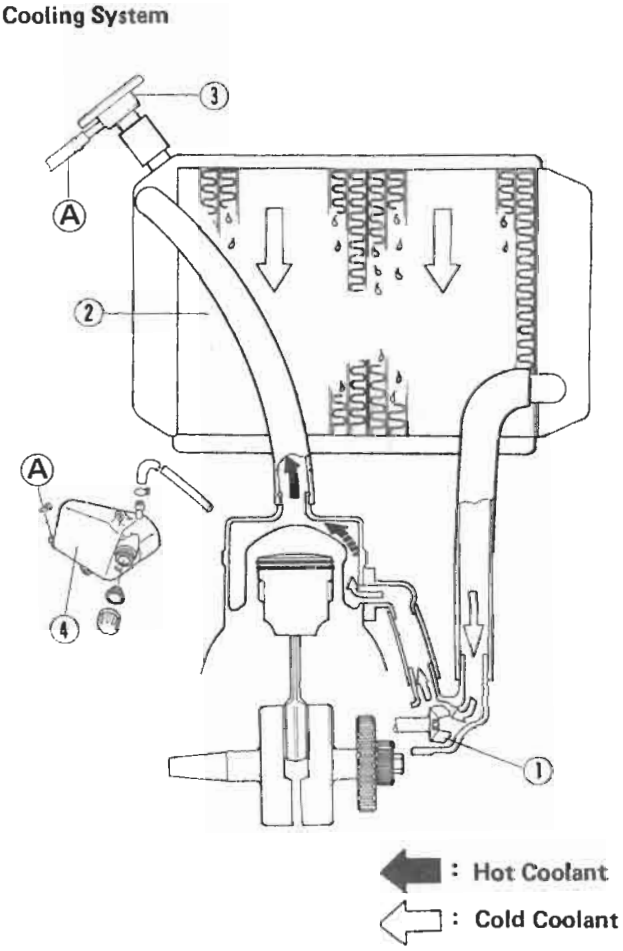

H : Apply high temperature grease.
R : Replacement Part

T1: 5.9 N-m (0.6 kg-m, 52 in-lb)
T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)
T3: 7.8 N-m (0.8 kg-m, 69 in-lb)
T4: 6.9 N-m (0.7 kg-m, 61 in-lb)

## Cooling System

The liquid cooling system is a pressurized forced circulation type. When the engine load varies, this system controls the engine temperature within narrow limits where the engine performs stably in various riding conditions, and is very durable.

**Cooling System**




○Water pump is driven by balancer shaft.

1. Water Pump
2. Radiator
3. Radiator Cap
4. Reservoir Tank

## Specifications

| | |
|---|---|
| **Original Coolant** | |
| **Type:** | **Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)** |
| **Color:** | **Green** |
| **Mixed ratio:** | **Soft water 50%, Coolant 50%** |
| **Freezing point:** | **−37°C (−35°F)** |
| **Total amount:** | **1.5 L (reservoir tank full level including radiator and engine)** |
| **Radiator Cap** | |
| **Relief pressure:** | **93 − 123 kPa (0.95 - 1.25 kg/cm² 14 − 18 psi)** |

## Special Tools

**Oil Seal Guide, ϕ8: 57001-1161**



**Bearing Driver Set: 57001-1129**



## Coolant

### *Coolant Deterioration Inspection*

- Visually inspect the coolant in the reservoir tank.
  - If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.
  - If the coolant gives off an abnormal smell when changing, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

**NOTE**

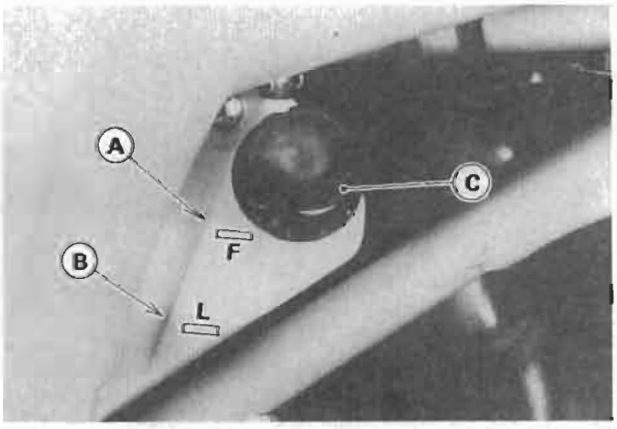
- *Be sure to inspect the coolant at the reservoir tank. If the coolant is checked by removing the radiator cap, the air must be bled from the cooling system.*

### *Coolant Level Inspection*

- Park the vehicle on level ground.
- Check the coolant level through the coolant level gauge on the reservoir tank. The coolant level should be between the FULL and LOW marks.

**NOTE**

- *Check the level when the engine is cold (room or ambient temperature).*
- *Do not check the level by removing the radiator cap. If the cap is removed, air may get into the coolant, and lower cooling efficiency.*




A. FULL Mark
B. LOW Mark
C. Reservoir Tank Cap

- If the amount of coolant is insufficient, unscrew the reservoir tank cap and add coolant through the filler opening to the FULL mark on the reservoir tank.
- Install the cap.

**Original Coolant:**

**Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)**

**Water and coolant mixed ratio:**

**1 : 1 (Water 50%, Coolant 50%)**

**Total amount:**

**1.5 L**

**CAUTION**

- **Soft or distilled water must be used with the antifreeze (see below for antifreeze) in the cooling system.**
- **If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.**

**NOTE**

- *Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*
- *In an emergency you can add soft water alone to the coolant reservoir tank, however, it must be returned to the correct mixture ratio by adding antifreeze concentrate as soon as possible.*

**CAUTION**

- **If coolant must be added often, or the reservoir tank completely runs dry, there is probably leakage in the system. Check the system for leaks (see Cooling System Pressure Testing).**

### *Coolant Changing*

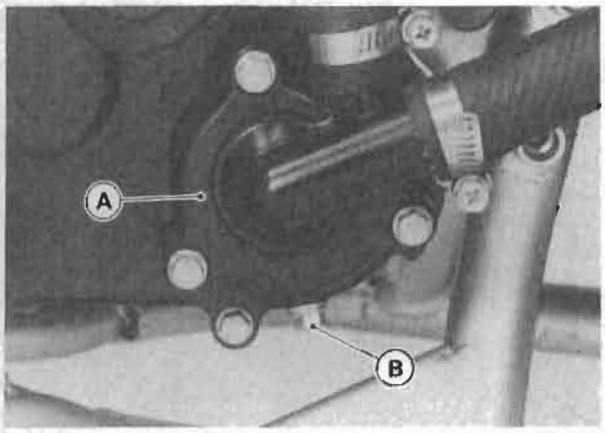
**CAUTION**

- **The coolant should be changed for every year.**

**WARNING**

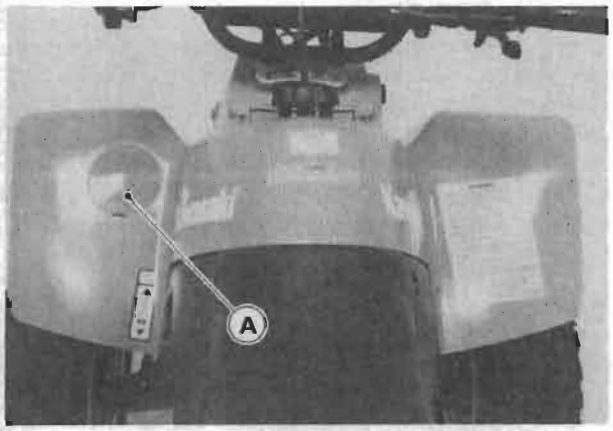
- **To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.**
- **Since coolant is harmful to the human body, do not use for drinking.**

- Park the vehicle on level ground.
- Place a container under the water pump.
- While relieving possible cooling system pressure, drain the coolant from the engine by removing the drain plug at the bottom of the water pump cover.



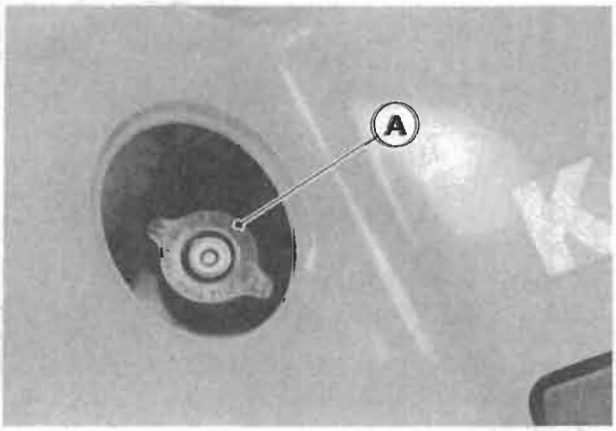

A. Water Pump B. Drain Plug

•Pull off the round lid on the left of the front fender



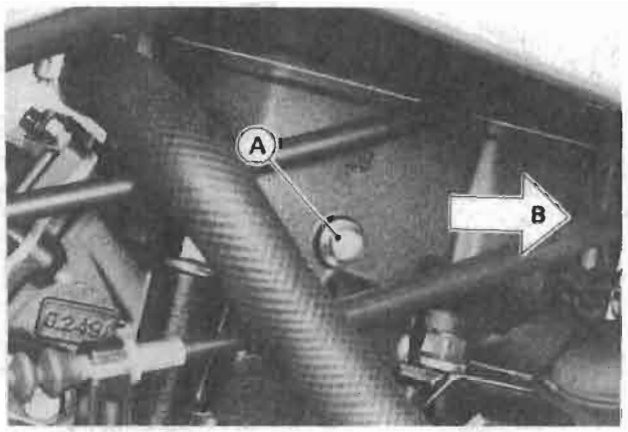

A. Lid

•Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.




A. Radiator Cap

•Unscrew the drain plug at the right side of the cylinder.



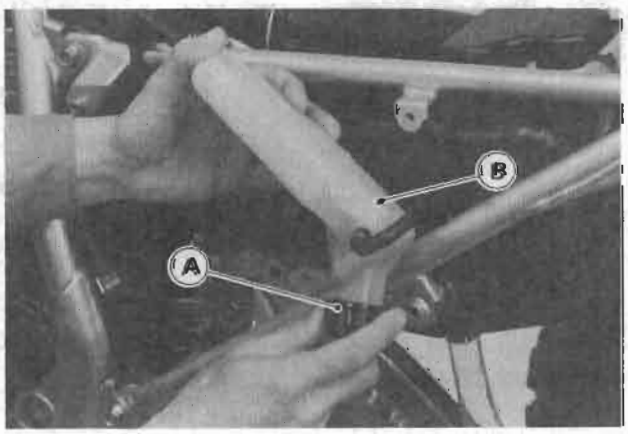

A. Drain Plug B. Front

•Coolant is drained from the radiator and engine. Immediately wipe off or wash out any spilled coolant on the frame, engine, or wheels.

**WARNING**

○**Coolant on tires will make them slippery and can cause an accident and injury.**

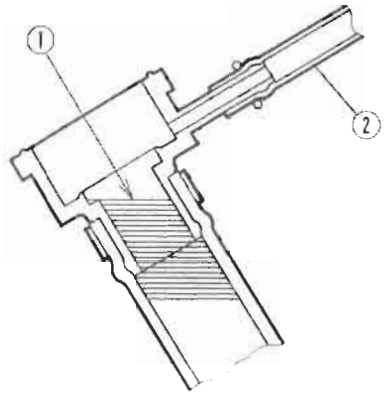
•Visually inspect the old coolant (see Coolant Deterioration Inspection).
•Tighten the two drain plugs to each specified torque (see Exploded View). Always replace the gaskets with new ones if they are damaged.
•Remove the rear fender and seat (see Frame chapter).
•Unscrew the bolts and remove the reservoir tank with hoses left installed.
•Unscrew the cap and pour the coolant into a container.




A. Cap B. Reservoir Tank

- Install the reservoir tank.
- Install the rear fender.
- Fill the radiator up to the bottom of the radiator filler neck with coolant, and install the cap, turning it clockwise by about ¼ turn.

**Radiator Filler Neck**

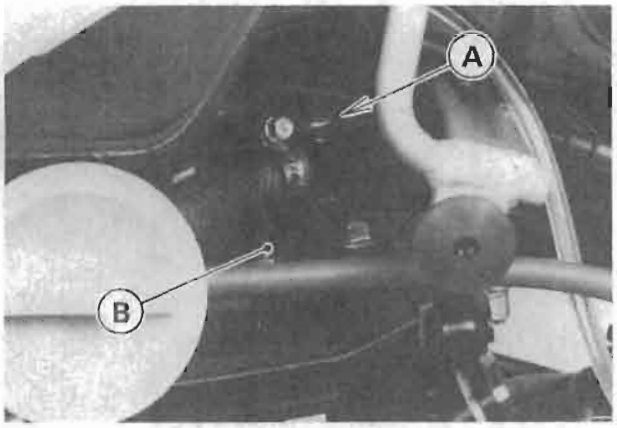



1. Coolant Level
2. Reservoir Tank Hose

**NOTE**

○*Pour in the coolant slowly so that it can expel the air from the engine and radiator.*

- Fill the reservoir tank up to the FULL mark with coolant, and install the cap. Total refill will take about **1.5 L** after the air inside the system is expelled.
- Loosen the air bleeder bolt at the hose fitting on the cylinder head, and the coolant begins to flow out the air bleeder bolt hole (that is, all the remaining air is forced out).




A. Air Bleeder Bolt B. Cylinder Head

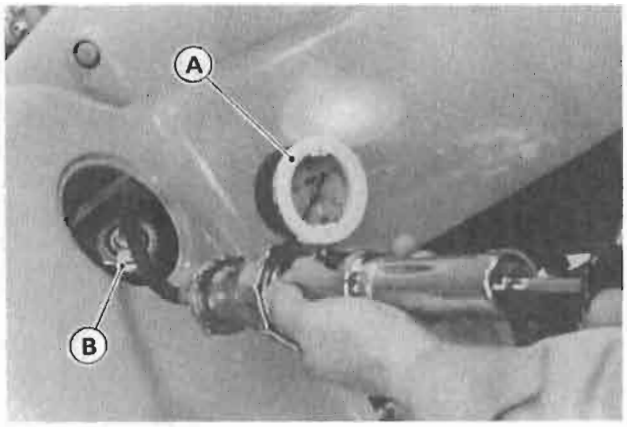
- Tighten the air bleeder bolt.
- Add the coolant into the radiator up to the filler neck.
- Install the radiator cap, turning it clockwise by about ¼ turn.
- Start the engine and warm it up by racing four or five times.
- Stop the engine.
- After the engine cools down, remove the radiator cap and check the coolant level. Add coolant up to the filler neck if the level has gone down.
- Install the radiator cap.
- Inspect the drain plugs and radiator cap for leaks.
- Install the round lid on the fender.

### *Cooling System Pressure Testing*

**CAUTION**

○**During pressure testing operation, do not exceed the pressure for which the system is designed to work. The maximum pressure: 123 kPa (1.25 kg/cm², 18 psi).**

- Set the vehicle on level ground.
- Remove the radiator cap (see Coolant Changing), and install a cooling system pressure tester on the radiator filler neck.
- Build up pressure in the system carefully until the pressure reaches **123 kPa (1.25 kg/cm², 18 psi)**
- Watch the gauge for at least **6 seconds.** If the pressure holds steady, the system is all right.




A. Pressure Tester B. Adapter

- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Run the engine until normal operating temperature is obtained.
- Remove the radiator cap carefully, and recheck for leaks when hot.
- If the pressure drops, check the system for external leakage. Any trace of leakage shows the damaged seal or part.
- ★If the pressure drops and no external source is found, check for internal leaks. Droplets in the transmission oil indicate internal leakage. Check the cylinder head gasket and the water pump oil seal for leak.

### *Cooling System Flushing*

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jackets and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the coolant passages and considerably reduce the efficiency of the cooling system.

- Drain the coolant.
- Fill the cooling system with fresh water mixed with a flushing compound.

**CAUTION**

**Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.**

- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant (see Coolant Changing).

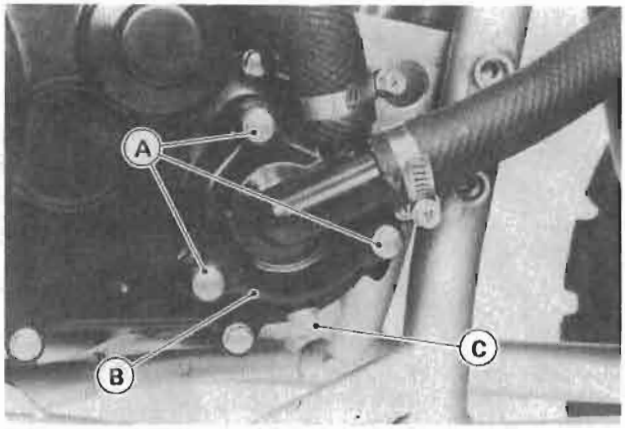
## Water Pump

### *Water Pump Impeller Removal*

**NOTE**

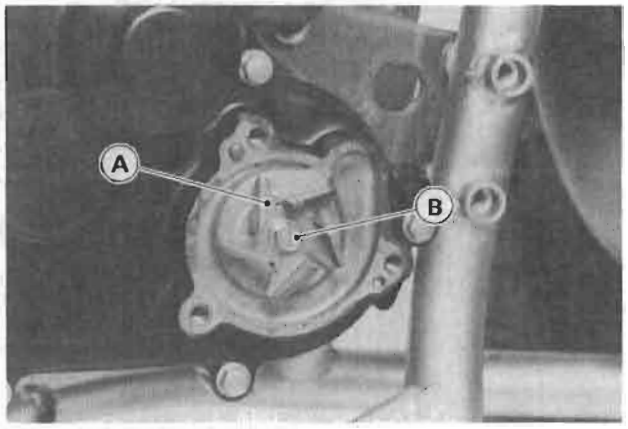
*It is not necessary to remove the pump impeller and bolt for right engine cover removal.*

- Drain the coolant from the engine by removing the drain plug at the pump cover. (see Coolant Changing).
- Unscrew the water pump cover mounting bolts, remove the water pump cover, and let the cover hang free.




A. Mounting Bolts
B. Water Pump Cover
C. Drain Plug

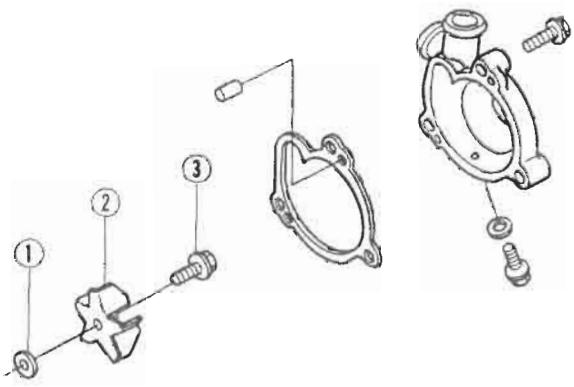
- Remove the impeller bolt and impeller.




A. Impeller
B. Bolt

### *Water Pump Impeller Installation*

- Install the impeller shim and the impeller.




1. Impeller Shim
2. Impeller
3. Impeller Bolt

**NOTE**

○*It is not necessary to select the impeller shim on this model.*

●Tighten the impeller bolt to the specified torque (see Exploded View).

### *Water Pump Shaft Removal*

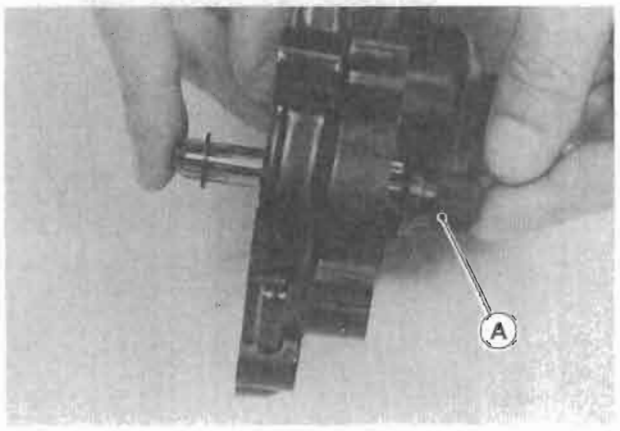
●Remove the following parts.
Water Pump Impeller
Right Engine Cover (see Clutch chapter)
●Pull out the water pump shaft.




A. Water Pump Shaft

### *Water Pump Shaft Installation Notes*

●Apply high temperature grease to the lips of the water pump oil seal.
●Using the impeller shaft oil seal guide (special tool) on the impeller oil seal, insert the impeller shaft, and mount the flat washer, impeller and bolt on the impeller shaft.

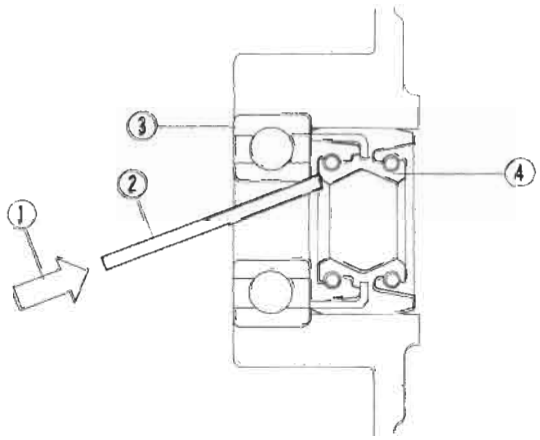



A. Oil Seal Guide, ϕ8 : 57001-1161

### *Water Pump Oil Seal Removal*

●Remove the water pump shaft (see Water Pump Shaft Removal).
●To remove the water pump oil seal, insert a metal rod into the right engine cover from the opposite side of the impeller, and tap evenly around the bottom of the seal.

**Water Pump Oil Seal Removal**



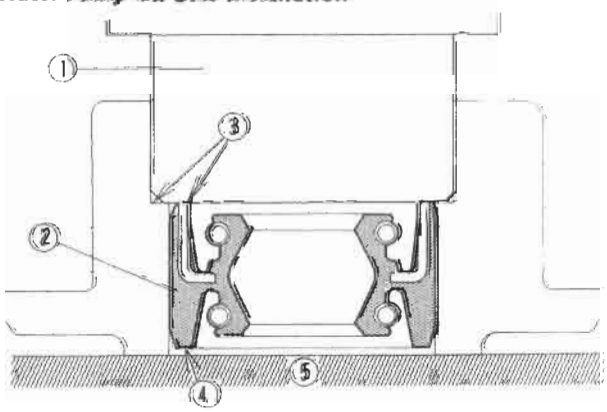

1. Tap
2. Metal Rod
3. Ball Bearing
4. Water Pump Oil Seal

●Replace the water pump oil seal with a new one.

### *Water Pump Oil Seal Installation*

●Remove the water pump bearing from the impeller side of the right engine cover.
○Use the bearing driver (special tool) which contacts the bearing outer race.
●Go first the soft side of the oil seal (marked side) and insert the oil seal into the right engine cover from the opposite side of the impeller.
●Press the oil seal into the hole by using the bearing driver set (special tool) until the opposite of the soft side is flush with the surface of the seal housing in the cover.

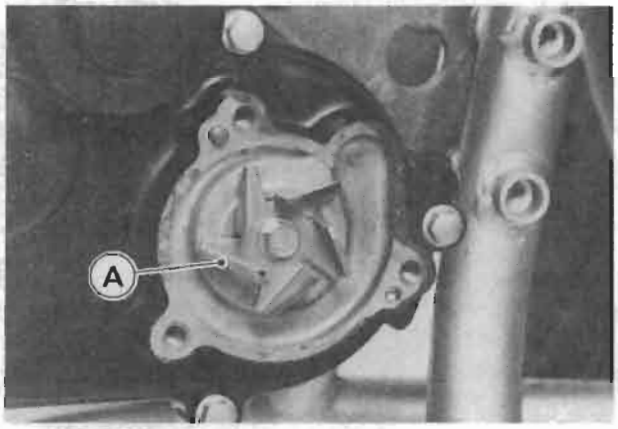
**Water Pump Oil Seal Installation**




1. Bearing Driver Set: 57001-1129
2. Water Pump Seal
3. Flush with the surface.
4. Soft Side (marked side)
5. Impeller Side of Right Engine Cover

•Install the ball bearing until it bottoms out. The marked side of the bearing faces outboard.
•Apply high temperature grease to the oil seal lips.

*Water Pump Inspection*
•Visually check the impeller.
★If the surface is corroded, or if the blades are damaged, replace the impeller.

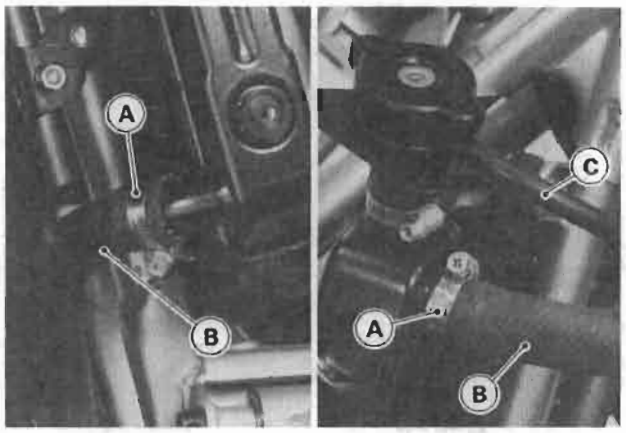



A. Impeller Blades

•Remove the water pump shaft (see Water Pump Shaft Removal).
•Check the impeller shaft for signs of damage.
★If necessary, replace the shaft with a new one.

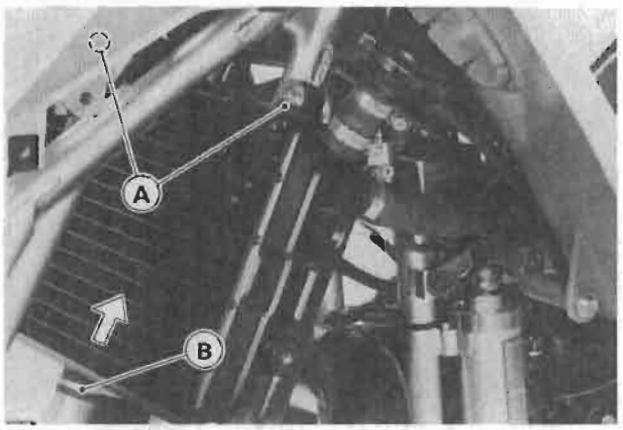
## Radiator

*Radiator Removal*
•Drain the coolant from the radiator and the engine (see Coolant Changing).
•Remove the right and left air scoops (see Frame chapter).
•Remove the reservoir tank hose end at the radiator.
•Loosen the hose clamps and pull off the radiator hoses on both sides.




A. Clamps
B. Radiator Hoses
C. Reservoir Tank Hose

•Remove the radiator mounting bolts.
•Lift up the radiator to clear the stopper.
•Remove the radiator taking care not to damage the radiator core.

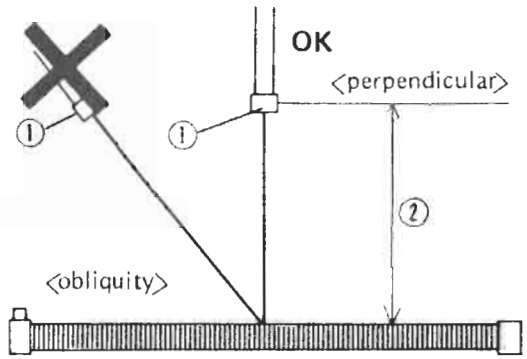



A. Radiator Mounting Bolts B. Stopper

*Radiator Cleaning*
•Remove the radiator, and then remove the grille.

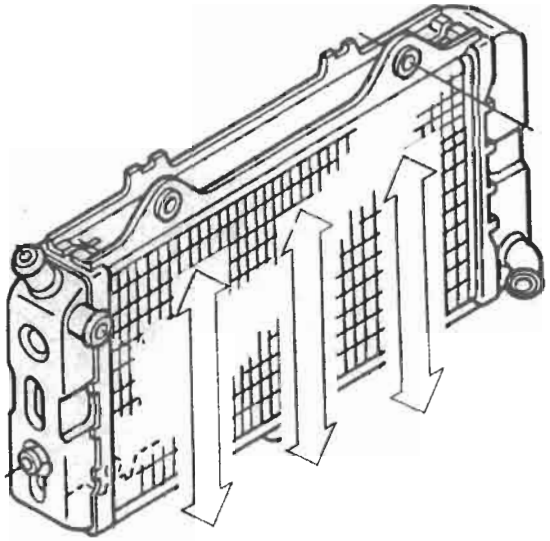
**CAUTION**

**○When cleaning the radiator with a steam cleaner, be careful of the following to avoid damage to the fins.**
**○Keep the steam gun over 0.5 m (20 in.) away from the radiator.**
**○Blow steam perpendicularly to the radiator face.**
**○Never blow steam at an angle against the fins but straight through fins in the direction of natural air flow.**



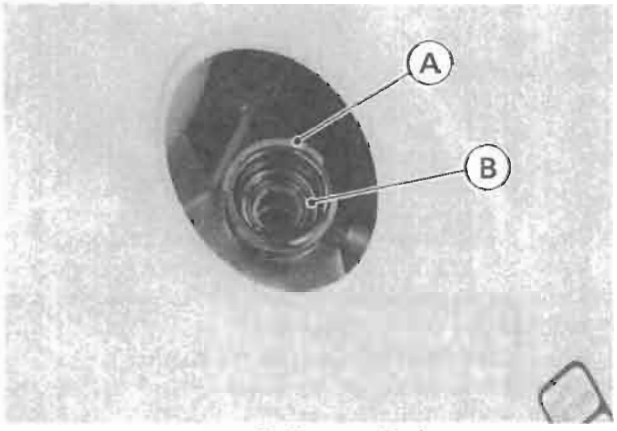

1. Steam Gun 2. More than 50 cm

●Run the gun vertically following the core fin direction.



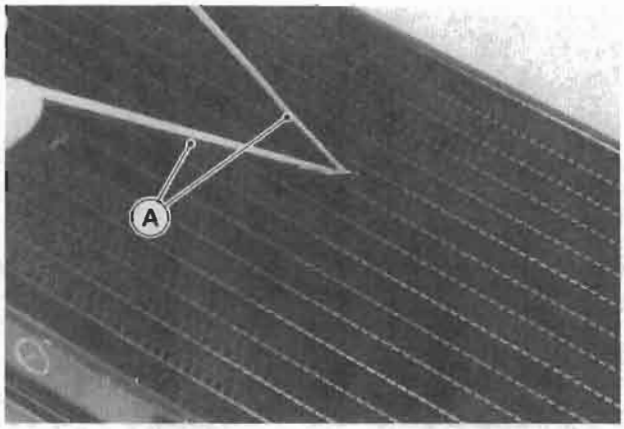
### *Radiator Inspection*

●Check the radiator filler neck for signs of damage.
●Check the condition of the top and bottom sealing seats in the filler neck. They must be smooth and clean for the radiator cap to function properly.




A. Top Seal B. Bottom Seal

●Remove the radiator and then remove the grille.
●Check the radiator core.
★If there are obstructions to air flow, remove them.
★If the corrugated fins are deformed, carefully straighten them with the blade of thin screw drivers.

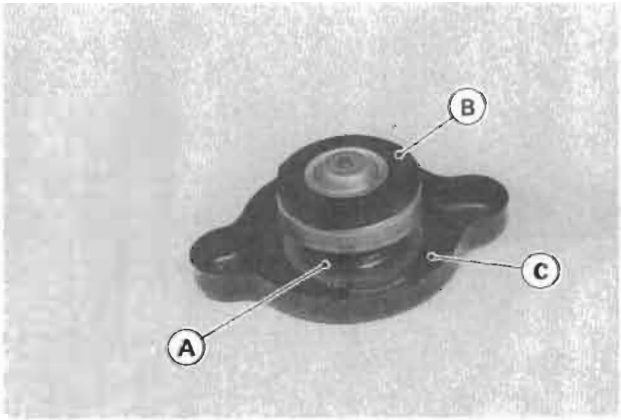



A. Thin Screw Drivers

★If the air passages of the radiator core are blocked more than **20%** by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

### *Radiator Cap Inspection*

●Check the condition of the valve spring, and the top and bottom valve seals of the radiator cap.
★If any one of them shows visible damage, replace the cap.




A. Valve Spring C. Top Seal
B. Bottom Seal

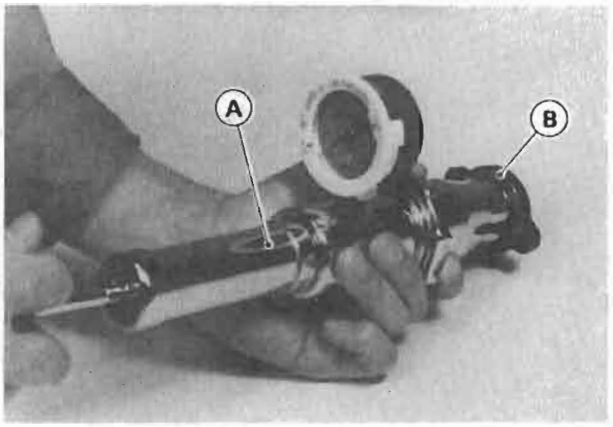
●Wet the cap sealing surfaces with water or coolant to prevent pressure leaks. Install the cap on a cooling pressure tester.
●Watching the pressure gauge, pump the tester to build up the test pressure. The cap must open at the relief pressure (the gauge hand flicks down).

**Radiator Cap Relief Pressure**

**93 – 123 kPa (0.95 – 1.25 kg/cm$^2$, 14 – 18 psi)**

Also, the cap must hold any pressure less than the relief pressure for at least 6 seconds.

- If the cap cannot hold the pressure, or if the relief pressure is too high or too low, replace the cap.




A. Pressure Tester B. Radiator Cap

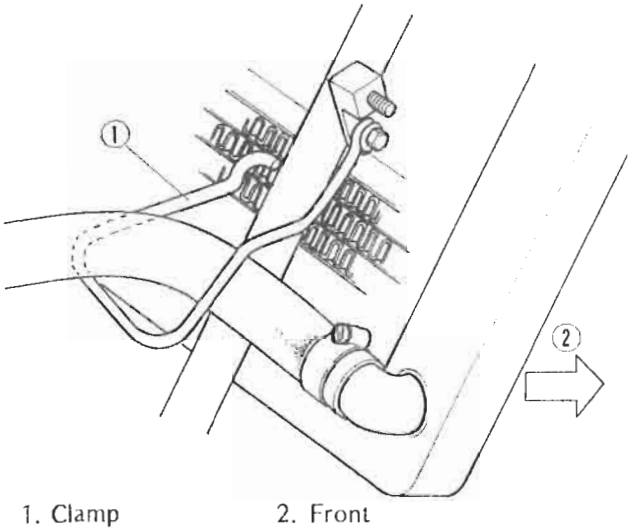
### *Radiator Hose, Reservoir Tank Hose Installation Notes*

- Route the radiator hoses and reservoir tank hoses according to the Cable and Harness Routing section in the General Information chapter.

**CAUTION**

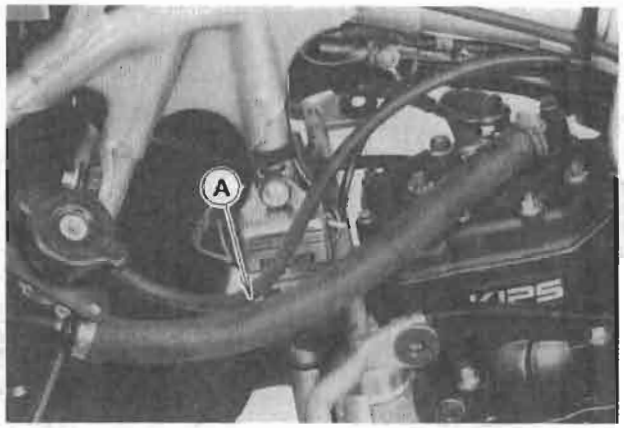
**Incorrect installation of reservoir tank vent hose could cause entering water or mud into cooling system.**

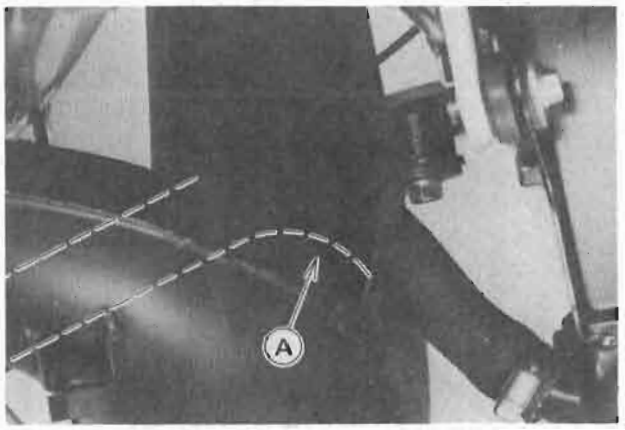
- Hold the right-hand radiator hose with a clamp to avoid its being burned by the exhaust pipe.




1. Clamp 2. Front

- Install the radiator hoses being careful to follow bending direction. Avoid sharp bending, kinking, flattening, or twisting.
- Push the hoses completely onto their fittings.
- Install the clamps as near as possible to the hose end to clear the raised rib on the fitting. This will prevent the hoses from working loose.




A. Hose Bend

### *Radiator Hose, Reservoir Tank Hose Inspection*

- Visually inspect the hoses for signs of deterioration. Squeeze the hose. A hose should not be hard and brittle, nor should it be soft or swollen.
- Replace any damaged hose.
- Tighten the hose clamps securely.

# Engine Top End

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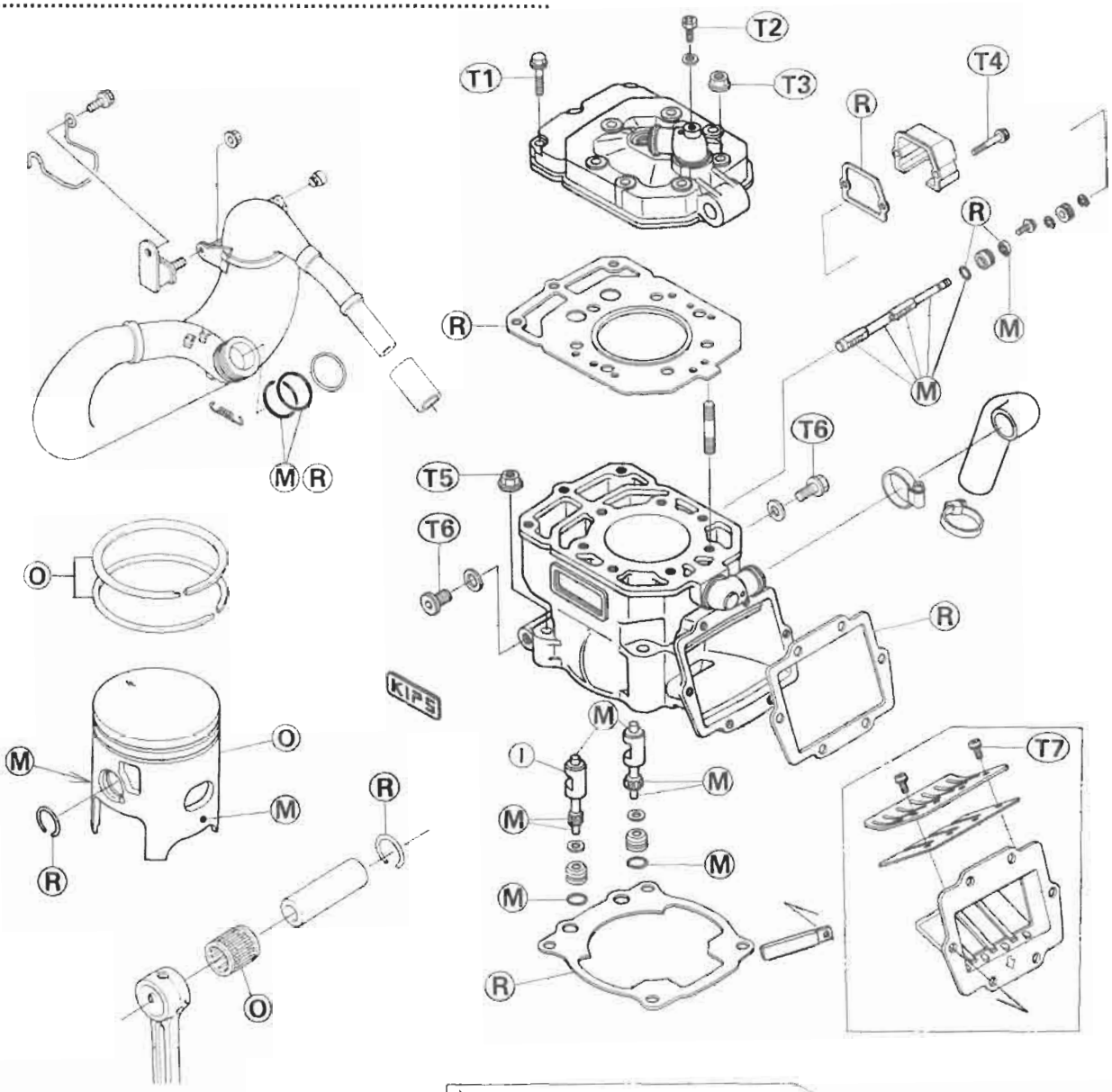

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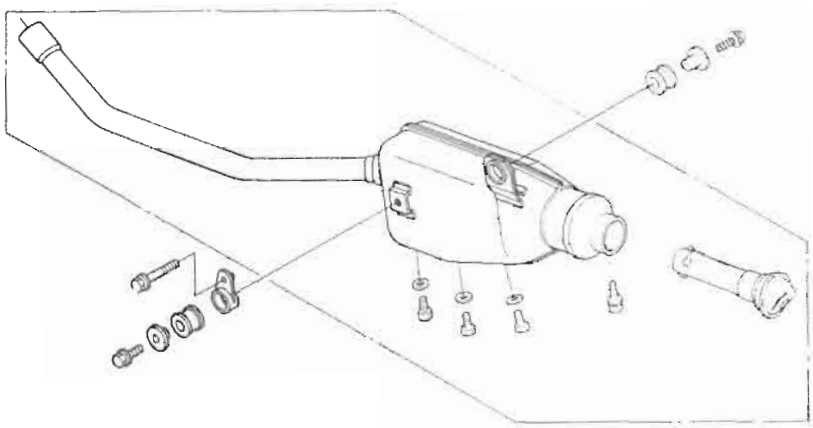
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## 4-2 ENGINE TOP END

### Exploded View



**H : Apply high temperature grease.**
**M : Apply a thin coat of molybdenum disulfide grease.**
**O : Apply 2-stroke racing oil.**
**R : Replacement Parts**

**T1: 9.8 N-m (1.0 kg-m, 87 in-lb)**
**T2: 5.9 N-m (0.6 kg-m, 52 in-lb)**
**T3: 25 N-m (2.5 kg-m, 18.0 ft-lb)**
**T4: 4.9 N-m (0.5 kg-m, 43 in-lb)**
**T5: 34 N-m (3.5 kg-m, 25 ft-lb)**
**T6: 15 N-m (1.5 kg-m, 11.0 ft-lb)**
**T7: 1.0 N-m (0.1 kg-m, 9 in-lb)**

**1. KAWASAKI Integrated Power Valve System (KIPS)**

The conventional two-stroke engine has a constant volume exhaust chamber. To get high power, the two-stroke engine sacrifices torque at low speed making low-speed operation difficult.

KIPS alters not only the exhaust chamber volume but also the exhaust port area and exhaust timing producing significantly more high speed power without loss of low-speed torque.

## Specifications

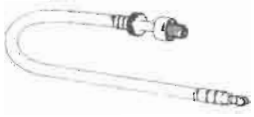
| Item | Standard | Service Limit |
|---|---|---|
| **Cylinder Head:** | | |
| Cylinder Compression (Usable range) | 785 – 1,230 kPa (8.0 – 12.5 kg/cm²) (114 – 178 psi) | – – – |
| Cylinder head warp | – – – | 0.05 mm |
| **Cylinder and Piston:** | | |
| Cylinder inside diameter | 67.400 – 67.415 mm | 67.51 mm |
| Piston diameter | 67.341 – 67.356 mm | 67.19 mm |
| Piston/cylinder clearance | 0.054 – 0.064 mm | – – – |
| Piston ring/groove clearance: | | |
| Top, second | 0.04 – 0.08 mm | 0.18 mm |
| Piston ring groove width: | | |
| Top, second | 1.03 – 1.05 mm | 1.13 mm |
| Piston ring thickness: | | |
| Top, second | 0.97 – 0.99 mm | 0.90 mm |
| Piston ring end gap: | | |
| Top, second | 0.15 – 0.35 mm | 0.65 mm |
| KIPS valve opening engine speed | 6,650 – 6,950 r/m (rpm) | – – – |

## Special Tools

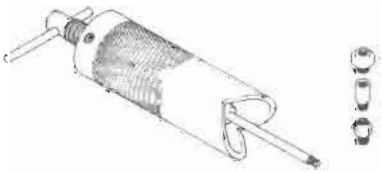
**Compression Gauge: 57001-221**



**Compression Gauge Adapter: 57001-1159**



**Piston Pin Puller Assembly: 57001-910**



## Muffler

### Spark Arrester Cleaning

This vehicle is equipped with a spark arrester approved for off-road use by the U.S. Forest Service. It must be properly maintained to ensure its efficiency. In accordance with the Periodic Maintenance Chart, clean the spark arrester.

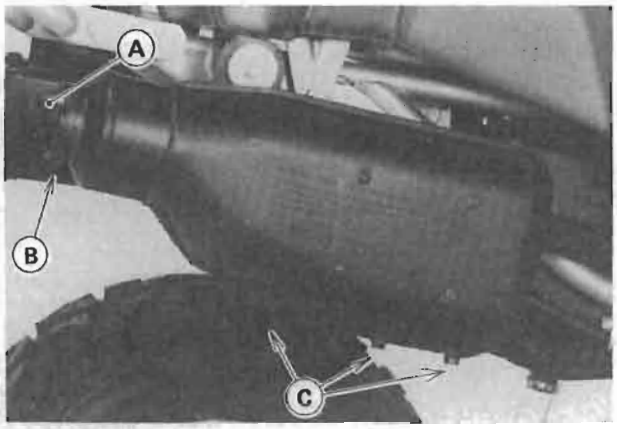
**WARNING**

○**To avoid burns, wear gloves while cleaning the spark arrester. Since the engine must be run during this procedure, the muffler will become hot.**

**CAUTION**

○**The spark arrester must be installed correctly and functioning properly to provide adequate fire protection.**

●Remove the drain plugs on the rear muffler.




A. Spark Arrester
B. Arrester Mounting Bolt
C. Drain Plugs

●In an open area away from combustible materials, start the engine with the transmission in neutral.
●Raise and lower engine speed while tapping on the muffler with a rubber mallet until carbon particles are purged from the muffler.

**WARNING**

○**Do not run the engine in a closed area. Exhaust gases contain carbon monoxide; a colorless, odorless, poisonous gas. Breathing exhaust gas leads to carbon monoxide poisoning, asphyxiation, and death.**
○**Never run the engine with the spark arrester removed. Hot carbon particles may start a fire.**

**NOTE**

○*Run the engine with the spark arrester installed during cleaning. This keeps the exhaust pressure higher and makes carbon particles purge easier.*

●Stop the engine.
●Install the drain plugs.
●Remove the spark arrester mounting bolt from the muffler.
●Pull the spark arrester out of the muffler.
●Scrape carbon deposits off the spark arrester and slide it back into the muffler.
●Install the mounting bolt and tighten it securely.

### Muffler Inspection

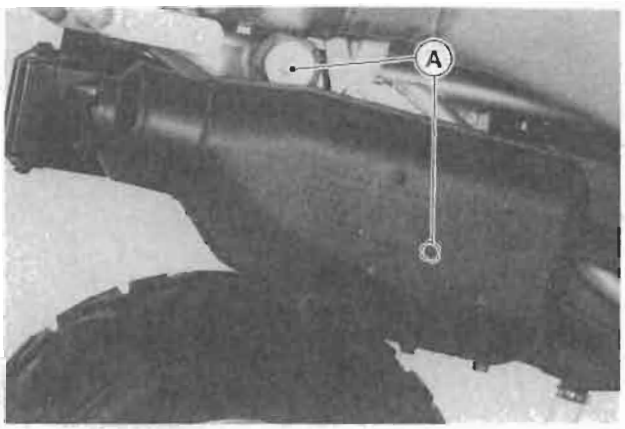
●Before removing the front muffler, check for signs of leakage at the front muffler inlet and at the connecting rubber seal.
★If there are signs of leakage around the rubber seal, remove the rear muffler and inspect the seal for damage.
☆If the rubber seal is damaged or has been leaking, replace it.
★If there are signs of leakage around the muffler inlet, remove the front muffler and inspect the gasket in the cylinder head and the O-rings on the muffler inlet.
☆If they are damaged or have been leaking, replace them.

### Rear Muffler Removal

**WARNING**

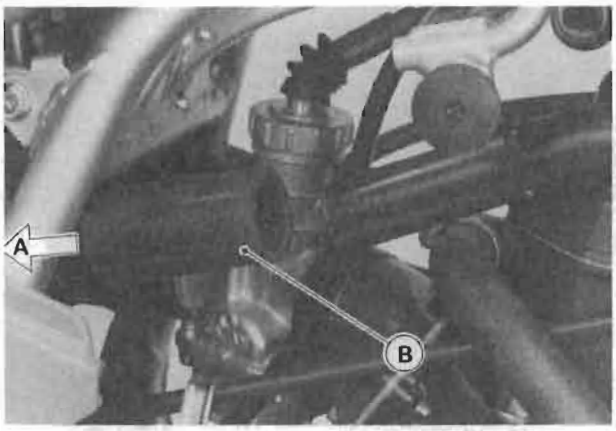
○**To avoid burns, do not remove the rear muffler when the muffler is still hot. Wait until it cools down.**

●Remove the following parts.
Right Side Cover (see the Frame chapter)
Rear Muffler Mounting Bolts

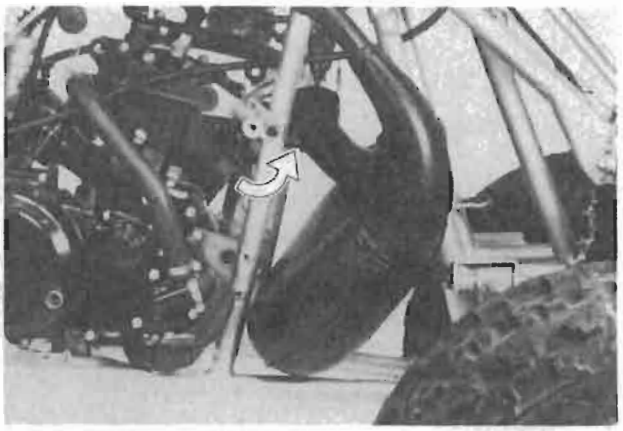



A. Mounting Bolts

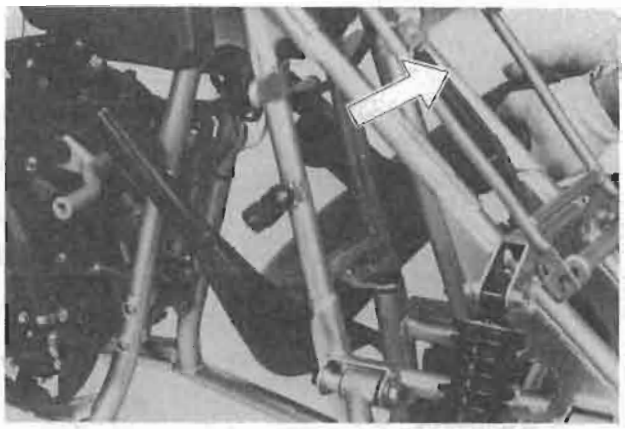
•Pull the rear muffler out of the connecting rubber seal and remove it.




A. Pull the rear muffler. B. Rubber Seal



•Take out the muffler from the vehicle left side.

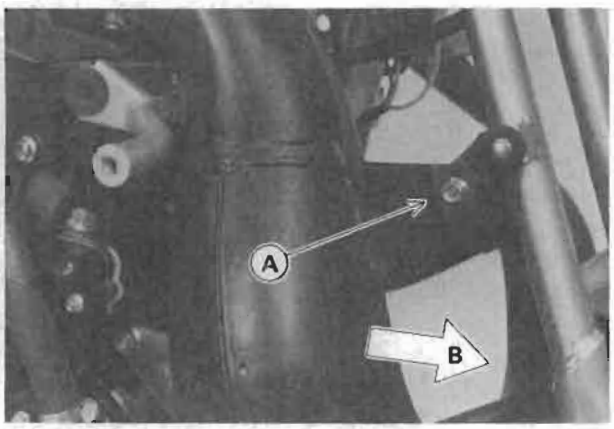


### *Front Muffler Removal*

**WARNING**

○**To avoid burns, do not remove the front muffler when it is still hot. Wait until it cools down.**

•Remove the following parts.
Front Fender (see the Frame chapter)
Radiator (see the Cooling System chapter)
Rear Muffler (see Rear Muffler Removal)
Muffler Inlet Springs
Front Muffler Mounting Nut



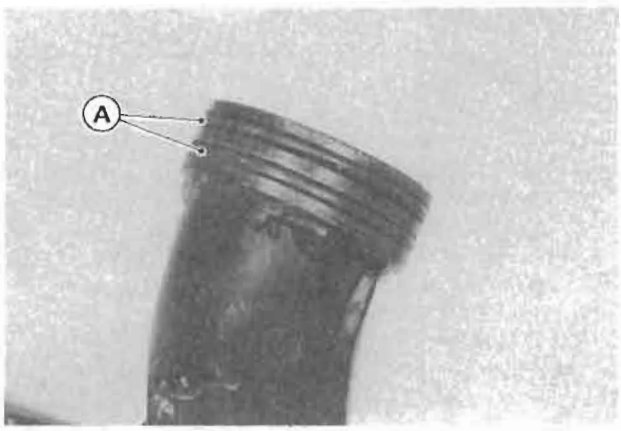

A. Muffler Mounting Nut B. Front

•Pull the muffler out of the cylinder and lay it on the frame.

### *Front Muffler Installation Notes*

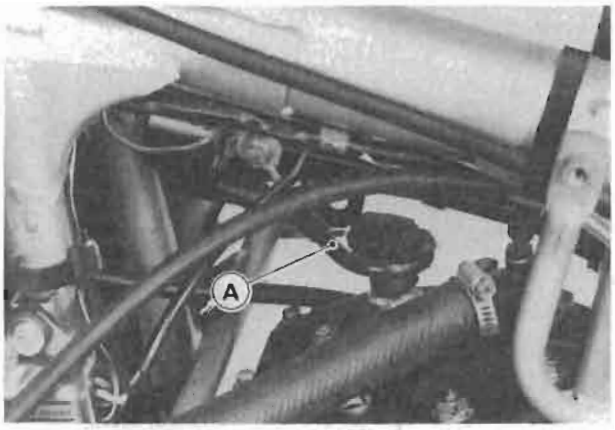
○Installation is the reverse of removal. Note the following.

•Apply molybdenum disulfide grease around the inlet of the muffler.



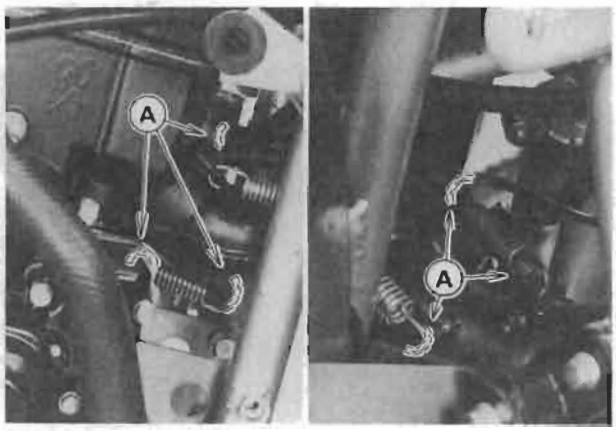

A. Grease here

●Route the spark plug lead and magneto output lead so that they do not touch the muffler.




A. Spark Plug Lead

●Install the muffler inlet springs noting the proper hook direction. The springs are identical.

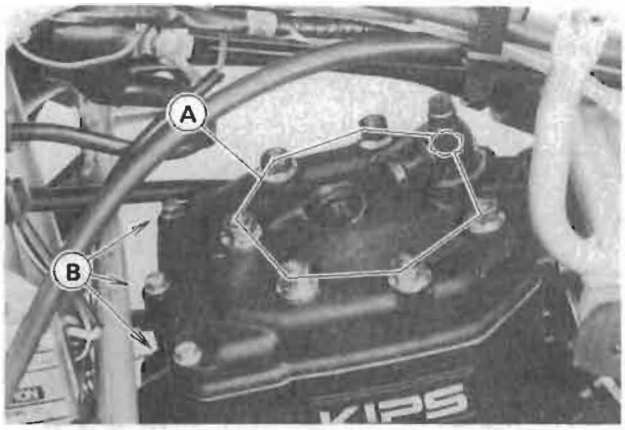



A. Hooks

## Cylinder Head

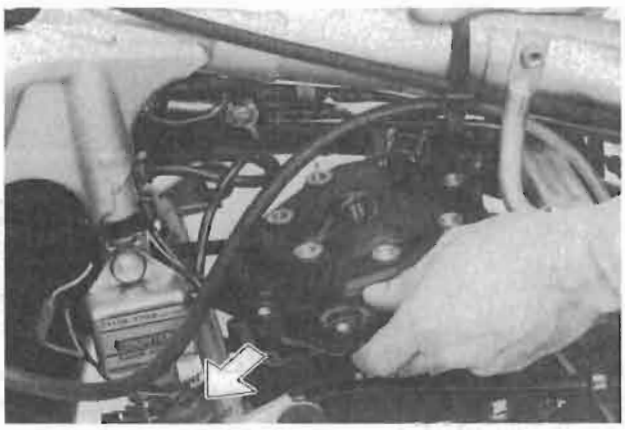
### *Cylinder Head Removal*

●Drain the engine coolant (see Coolant Changing in the Cooling System chapter).
●Remove the fuel tank mounting bolts and move the tank a little rearward to access the cylinder head. Be sure the fuel hose does not become detached (see Fuel Tank Removal in the Fuel System chapter).
●Remove the following parts.
Spark Plug
Radiator Hose End at the Cylinder Head
●First remove the 6 mm bolts, and then the 8 mm nuts in that order. This prevents excessive stress on the small bolts.




A. 8 mm Nuts B. 6 mm Bolts

●Move the hoses, cables and wiring harness sheath to allow raising the cylinder head.
●Lift up the cylinder head to clear the stud bolts and remove it from the vehicle left side.



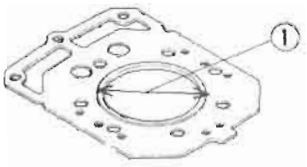
●Remove the cylinder head gasket.

**NOTE**

○*Scrape residual gasket material from the cylinder and cylinder head.*

### *Cylinder Head Installation Notes*

●Replace the cylinder head gasket with a new one.
●Install the cylinder head gasket with the smaller diameter side of the grommet facing up.




1. Grommet Diameter

•First tighten the **8 mm** nuts cross tighten, and then the **6 mm** bolts to the specified torque (see Exploded View).

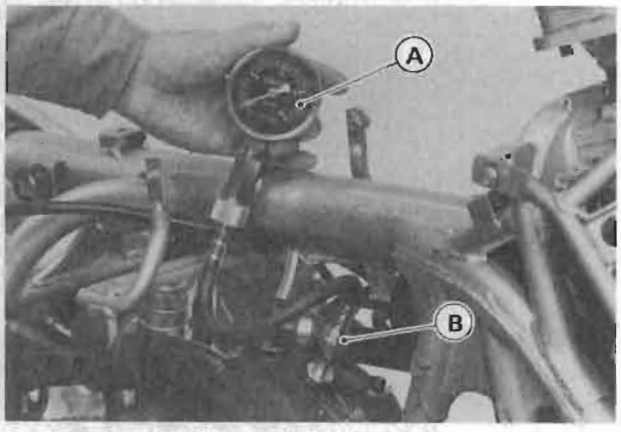
### *Cylinder Head Cleaning*

Refer to Piston and Cylinder Cleaning in the Cylinder and Piston section.

### *Cylinder Compression Measurement*

A compression test is very useful as an aid in determining the condition of the engine. Low compression may be due to cylinder wear; worn piston ring grooves; worn, broken, or sticking piston rings; cylinder head leaks; or damage to the engine such as piston seizure. Too high compression may be due to carbon build-up on the piston head and cylinder head.

•Before measuring compression, check that the cylinder head nuts, bolts and cylinder nuts are properly tightened.
•Throughly warm up the enigne so that engine oil between the piston and cylinder wall will halp seal compression as it does during normal running.
•Stop the engine.
•Remove the fuel tank mounting bolts and move the tank left for spark plug access (see Fuel Tank Removal in the Fuel System chapter).
Take care that the fuel hose does not slip out of place.
•Remove the spark plug and attach compression gauge (special tool) straight and firmly into the spark plug hole.
•With the throttle fully open, turn the engine over sharply with the kickstarter several times until the compression gauge stops rising; the compression is the highest reading obtainable.




A. Compression Gauge: 57001-221
B. Adapter: 57001-1159

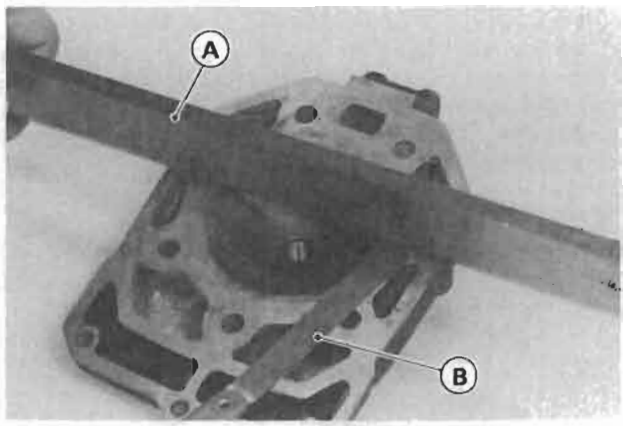
**Cylinder Compression (Usable Range)**

**785 – 1,230 kPa**
**(8.0 – 12.5 kg/cm², 114 – 178 psi)**

★If the cylinder compression is higher than the usable range, check the following:
○Carbon build-up on the piston crown and cylinder head–clean off any carbon on the piston crowns and cylinder head.
○Cylinder head gasket, cylinder base gasket–use only the proper gasket. The use of a gasket of incorrect thickness will change the compression.
★If cylinder compression is lower than the usable range, check the following:
○Gas leakage around the cylinder head–replace the damaged gasket and check the cylinder head for warp.
○Gas leakage from the crank chamber–check the crankshaft oil seals and reed valves.
○Check the joint between the crankcase halves.
○Piston/cylinder clearance, piston seizure.
○Piston rings, piston ring grooves wear.

### *Cylinder Head Warp Inspection*

•Lay a straightedge across the lower surface of the head at several different points, and measure warp by inserting a thickness gauge between the straightedge and the head.
★If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.




A. Straightedge B. Thickness Gauge

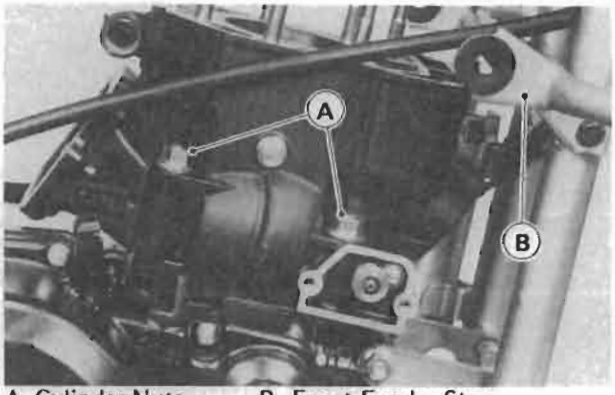
**Cylinder Head Warp**

**Service Limit:** **0.05 mm**

## Cylinder and Piston

### *Cylinder and Piston Removal*

- Remove the following parts.
  - Front and Rear Mufflers
  - Cylinder Head (see Cylinder Head Removal)
  - Water Hose End at the Cylinder
  - KIPS Governor Lever Cover, Boot and Outside Governor Lever (see Right Engine Cover Removal in the Engine Right Side chapter).
  - Carburetor (see Carburetor Removal in Fuel System chapter)
  - Front Fender Stay
  - Cylinder Nuts
- Remove the cylinder nuts.

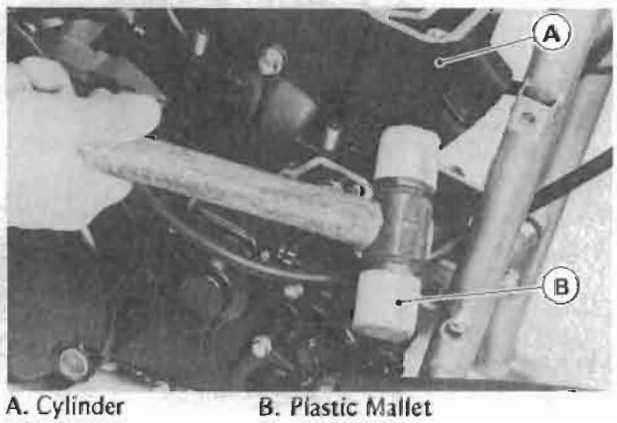



A. Cylinder Nuts B. Front Fender Stay

- Set the piston at **BDC** (bottom dead center) to facilitate cylinder removal.
- Lift up the cylinder and remove the cylinder base gasket. If necessary, lightly tap around the cylinder with a plastic mallet, taking care not to damage the cylinder.

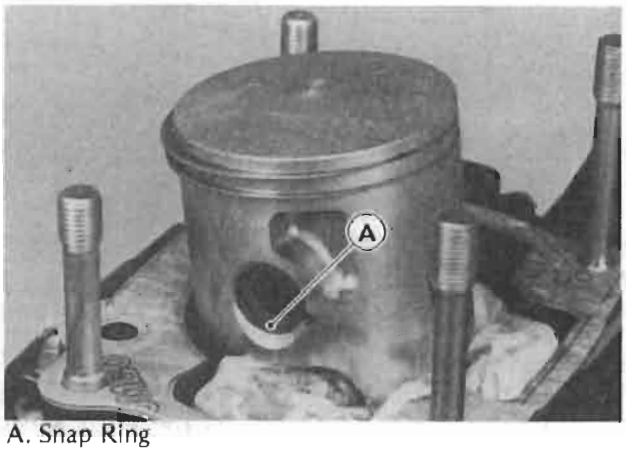
**CAUTION**

○**Do not twist the cylinder as you slide it off the piston. Twisting may cause the piston rings to pop into the intake port. This will cause the cylinder to jam, making removal difficult. If the cylinder does jam, remove the reed valve and press the piston rings back into position.**



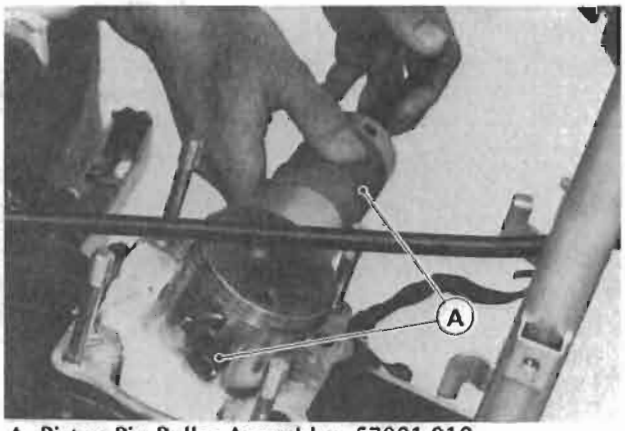

A. Cylinder B. Plastic Mallet

- Remove the cylinder from the vehicle right side.
- Stuff a clean cloth into the crankcase opening around the connecting rod so that no parts will fall into the crankcase.
- Remove one of the piston pin snap rings with needle nose pliers.




A. Snap Ring

- Remove the piston by pushing the piston pin out the side from which the snap ring was removed. Use the piston pin puller assembly (special tool) if necessary.




A. Piston Pin Puller Assembly: 57001-910

- Remove the piston and pull out the connecting rod small end needle bearing.

### *Cylinder and Piston Installation Notes*

- Apply 2-stroke oil to the connecting rod needle bearing and fit it into the connecting rod.
- Install the piston and piston pin. The arrow on the top of the piston must point toward the front.

**NOTE**

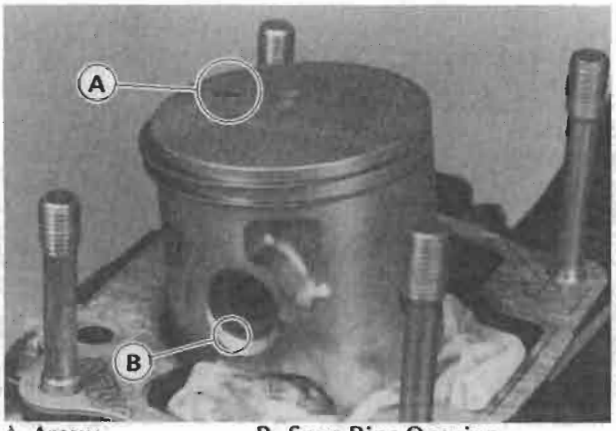
○*If the piston is replaced with a new one, check that piston to cylinder clearance is in the specified range (see Piston/Cylinder Clearance).*

•When installing a piston pin snap, compress it only enough to install it and no more.

CAUTION

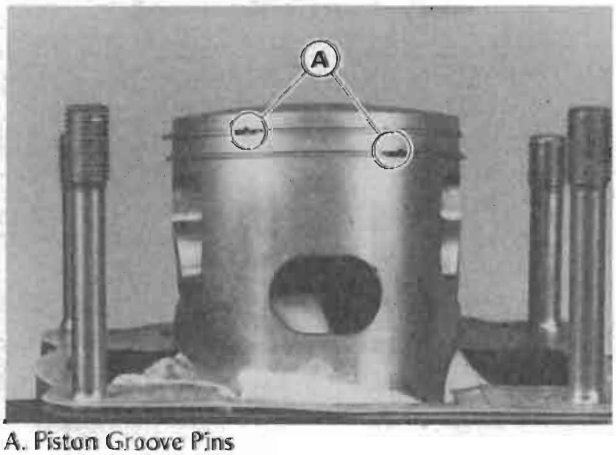
○**Do not reuse snap rings, since removal weakens and deforms them. They could fall out and score the cylinder wall.**

•After installation, turn the snap ring so that its opening does not coincide with the groove in the side of the piston.



A. Arrow B. Snap Ring Opening

•Check that each R marked side of the piston rings faces up (see Piston Ring Installation Notes).
•Remove the cloth that covers the cylinder base hole, and set the piston at BDC (bottom dead center) to facilitate cylinder installation.
•Install a new cylinder base gasket.
•Apply a little 2-stroke oil to the piston rings and the inside wall of the cylinder.
•If the piston is a new one, apply thin coat of molybdenum disulfide grease to the front and rear of the piston skirt.
•Fit the base of the cylinder over the rings, pressing in on opposite sides of the rings as necessary. Be certain that the rings do not slip out of position. The pin in each piston groove must be between the ends of each piston ring.

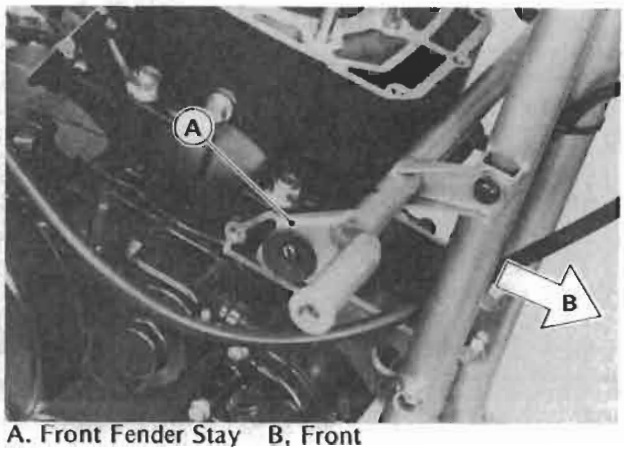


A. Piston Groove Pins

CAUTION

○**Do not twist the cylinder during installation. See Cylinder and Piston Removal.**

•Cross-tighten the cylinder nuts to the specified torque (see Exploded View).
•Install the outside governor lever, the lever boot, and the governor lever cover (see Right Engine Cover Installation Notes in the Engine Right Side chapter).
•Be sure to install the front fender stay as shown. Do not install it backward or upside down.



A. Front Fender Stay B. Front

*Piston Ring Removal*

•Remove the cylinder.
•Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.

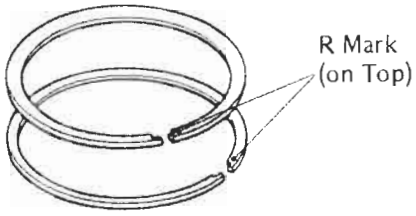


A. Piston Ring

*Piston Ring Installation Notes*

○The top and second rings are identical.
•Install the piston rings so that the correct side faces upward as shown.

**Piston Ring Installation**




●Install the piston rings by hand. First fit one end of the piston ring against the pin in the ring groove, spread the ring opening with the other hand and then slip the ring into the groove.

### *Piston and Cylinder Cleaning (Decarbonization)*

The piston head, exhaust port, sub-ports, KIPS valves, cylinder head, and mufflers can fill up with carbon and other exhaust by-products over an extended period of operation, resulting in a drop in performance.

●Remove the mufflers, and scrape the carbon off the muffler openings.

●Remove the cylinder head, scrape out any carbon, and clean the head with high-flash point solvent.

●Remove the cylinder, and carefully scrape the carbon out of the exhaust port and sub-ports.

●Check for a crust of minerals and rust in the cylinder head and cylinder water jackets, and remove the minerals and rust deposits.

●Remove the piston, scrape off carbon, and then lightly polish the piston with fine emery cloth.

●Clean carbon and dirt out of the piston ring grooves using a suitable tool.

**CAUTION**

○**Carbon particles can be very abrasive to piston rings. Don't allow such particles to fall onto the cylinder wall.**

●Remove the KIPS valves and clean them (see KIPS Valve and Valve Operating Rod Inspection/Cleaning).

### *Cylinder Wear Inspection*

●Inspect the inside of the cylinder for scratches and abnormal wear.

★If the cylinder is damaged or badly worn, replace it with a new one.

●Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement using an inside micrometer or a cylinder gauge.

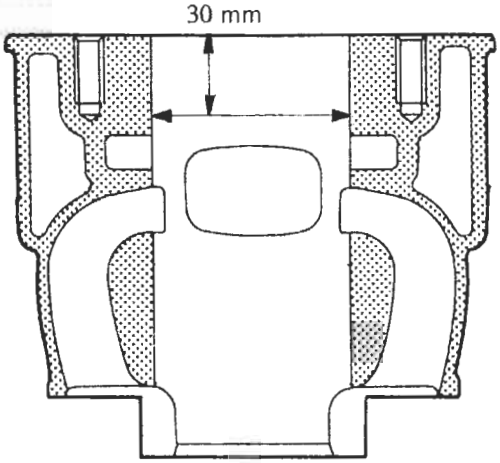
★If any measurement exceeds the service limit, or if there is a difference of more than 0.05 mm between the two measurements, the cylinder must be replaced with a new one.

**NOTE**

○*The ELECTRO FUSION cylinder cannot be bored or honed. If altering the cylinder ports, take care that the cylinder wall does not get scratched or otherwise damaged.*

○*Measure cylinder inside diameter when the cylinder is cold (room or ambient temperature).*

**Cylinder Inside Diameter Measurement**




**Cylinder Inside Diameter**

| | |
|---|---|
| **Standard:** | **67.400 – 67.415 mm and less than 0.01 mm difference between any two measurements** |
| **Service Limit:** | **67.51 mm, or more than 0.05 mm difference between any two measurements** |

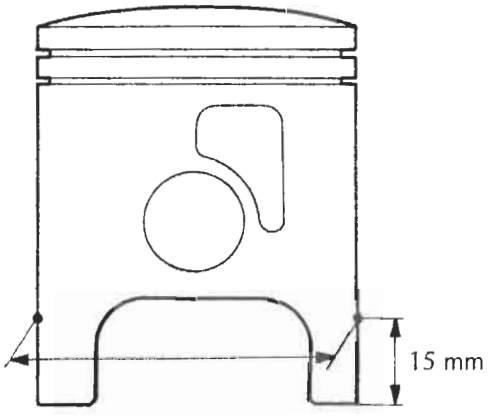
### *Piston Diameter Measurement*

●Measure the outside diameter of the piston **15 mm** up from the bottom of the piston at a right angle to the direction of the piston pin.

**NOTE**

○*Measure the piston diameter when the piston is cold (room or ambient temperature).*

**Piston Diameter Measurement**



★If the measurement is under the service limit, replace the piston.

**Piston Diameter**

| | |
|---|---|
| **Standard:** | **67.341 – 67.356 mm** |
| **Service Limit:** | **67.19 mm** |

**NOTE**

○*Abnormal wear such as a marked diagonal pattern across the piston skirt may mean a bent connecting rod or crankshaft.*

### *Piston/Cylinder Clearance*

The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values. Measure the piston diameter and cylinder diameter as just described.

**Piston/Cylinder Clearance**

**0.054 – 0.064 mm**

**NOTE**

○*Whenever the piston or cylinder has been replaced with a new one, the vehicle must be broken in the same as with a new machine.*

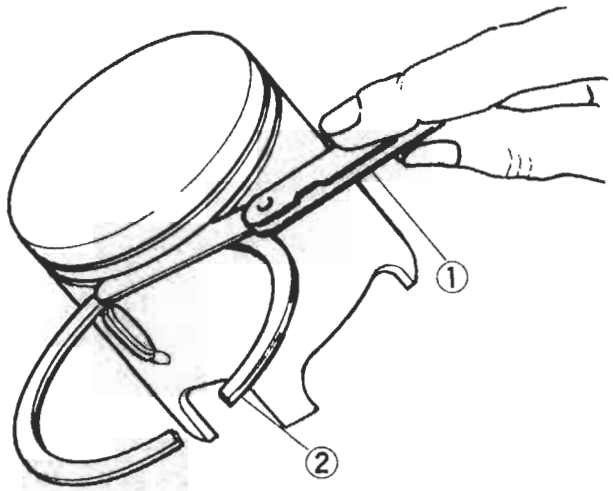
### *Piston Ring, Piston Ring Groove Inspection*

- ●Visually inspect the piston rings and the piston ring grooves.
- ★If the rings are worn unevenly or damaged, they must be replaced.
- ★If the piston ring grooves are worn unevenly or damaged, the piston must be replaced and fitted with new rings.
- ●Check for uneven groove wear by inspecting the ring seating.
- ★The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.
- ●With the piston rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance.

**Piston Ring/Groove Clearance**

| | |
|---|---|
| **Top, Second:** | |
| **Standard:** | **0.04 – 0.08 mm** |
| **Service Limit:** | **0.18 mm** |

**Groove Clearance Measurement**




1. Thickness Gauge
2. Piston Ring

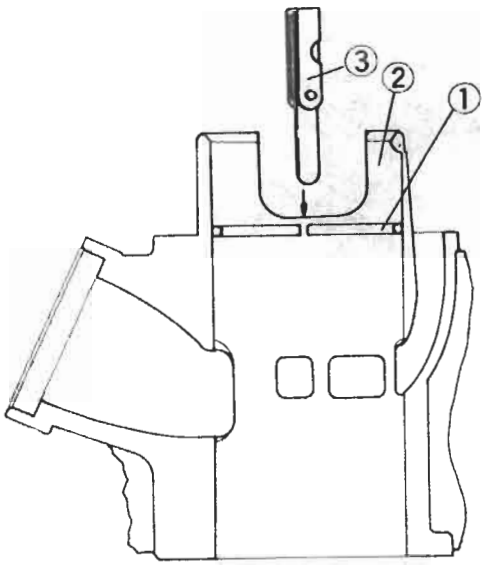
### *Piston Ring End Gap Inspection*

- ●Place the piston ring inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- ●Measure the gap between the ends of the ring with a thickness gauge.

**Piston Ring End Gap**

| | |
|---|---|
| **Top, Second:** | |
| **Standard:** | **0.15 – 0.35 mm** |
| **Service Limit:** | **0.65 mm** |

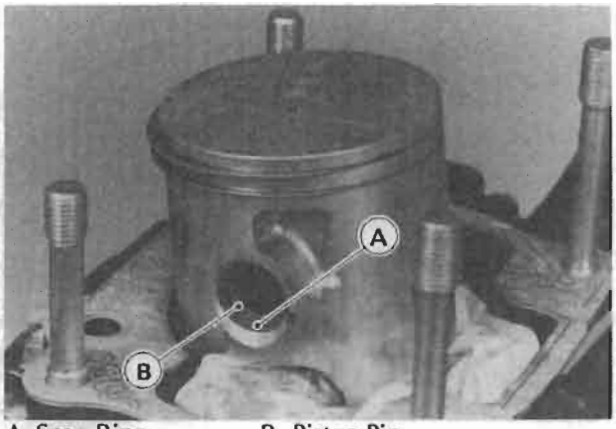
**End Gap Measurement**




1. Piston Ring 2. Cylinder Block 3. Thickness Gauge

### *Piston, Piston Pin, and Connecting Rod Wear Inspection*

•Visually inspect the snap rings are fitted in place.
★If the ring shows weakness or deformation, replace the ring. Also if the pin hole groove shows excessive wear, replace the piston.
•Visually inspect the piston pin hole and connecting rod small end hole.
★If the piston pin hole shows uneven wear, replace piston.
★If the rod small end hole shows uneven wear, replace the rod, or crankshaft assembly.
•Visually inspect the outer surface of the piston pin.
★If the pin shows color change or stepped wear, replace the pin and needle bearing.

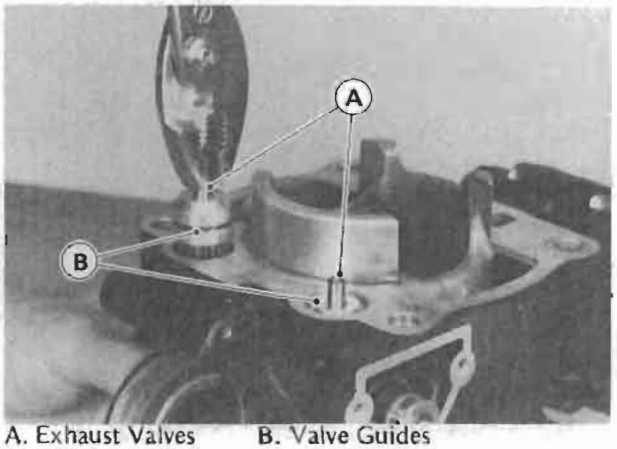


A. Snap Ring B. Piston Pin

•Check the needle bearing.
○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
★If there is any doubt as to the condition of a needle bearing, replace the bearing and piston pin.

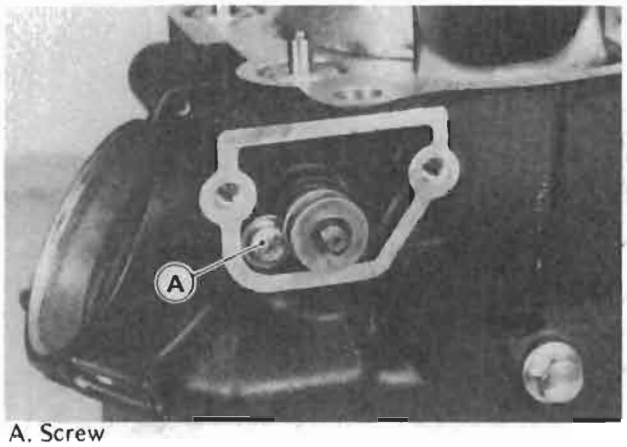
### *KIPS Valve Removal*

•Set the cylinder unit upside down on a clean surface.
•Remove the valve guides from the cylinder by pulling the valve bottom up.



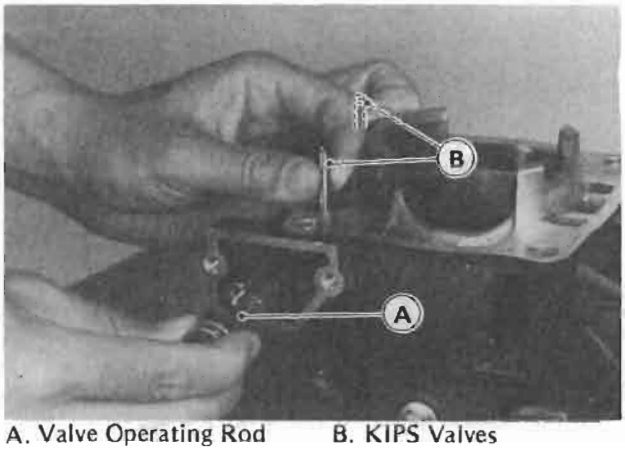
A. Exhaust Valves B. Valve Guides

•Take out the valve washers.
•Remove the rod guide holding screw and washer.



A. Screw

•While lifting up the KIPS valves, pull the valve operating rod out of the cylinder.



A. Valve Operating Rod B. KIPS Valves

•Take off the valves.
•If necessary, remove the rod plug from the left side of the cylinder.

### *KIPS Valve Installation Notes*

•Check the gasket on the left plug for signs of damage. If necessary, replace it with a new one.
•Install the left plug on the cylinder and tighten it to the specified torque (see Exploded View).
•Clean carbon and dirt out of the cylinder exhaust port and the sub-ports using a suitable tool.
•Check the valves, valve guides, operating rod, oil seal and O-rings (see KIPS Valve and Valve Operating Rod Inspection/Cleaning)

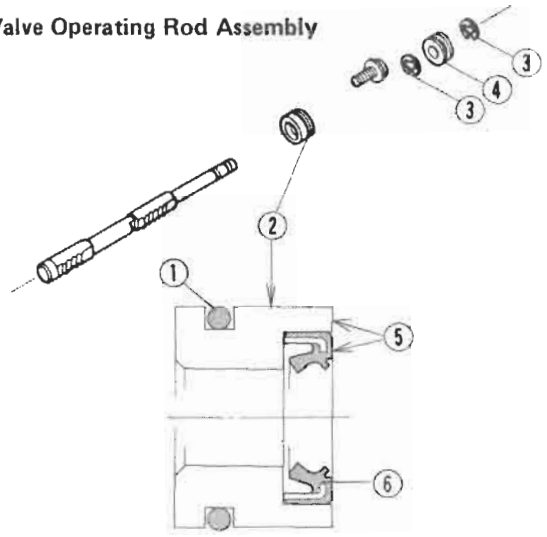
**NOTE**

○*The right KIPS valve has a right-rising groove and the left KIPS valve a left-rising slit in the installed position. Be careful not to mix up the right and left valves.*

### *KIPS Valve Operating Rod Assembly Notes*

- Install the oil seal in the rod guide as shown.
- Apply molybdenum disulfide grease to the O-ring and the lip of the oil seal. Then, install the rod guide with the oil seal facing outward.

**Valve Operating Rod Assembly**




1. O-Ring
2. Rod Guide
3. E-Rings
4. Collar
5. Flush with the surfaces.
6. Oil Seal

### *KIPS Valve Operation Inspection*

- Remove the governor lever cover and the rubber boot (see Right Engine Cover Removal in the Engine Right Side chapter).
- Start the engine.
- Visually check that the valve operating rod moves as the engine speed is raised. The rod should begin to move at about **6,650 – 6,950 r/min (rpm)**.

★If the valve operating rod does not move as the engine speed is raised, the valves may be sticking due to carbon accumulation. Check and clean the KIPS valves (see KIPS Valve and Valve Operating Rod Inspection/Cleaning).

### *KIPS Valve and Valve Operating Rod Inspection/Cleaning*

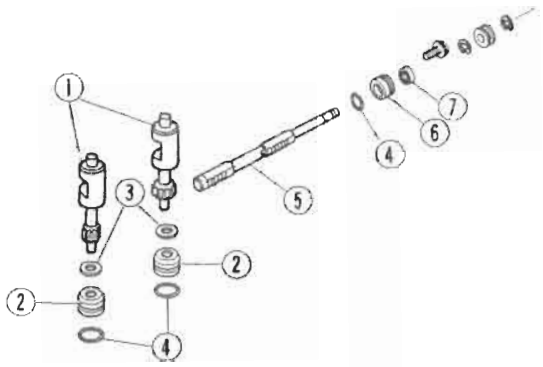
- Remove the KIPS valves and the valve operating rod from the cylinder.
- Visually inspect the valves, the valve guides, and the valve operating rod for signs of damage.

★If necessary, replace them with new ones.

- Check the oil seal in the rod guide and the O-rings on the valve guides and the rod guide for damage.

★If the oil seal or O-rings are not in good condition, replace them.

**KIPS Parts Inspection**




1. KIPS Valves
2. Valve Guides
3. Washers
4. O-Rings
5. Valve Operating Rod
6. Rod Guide
7. Oil Seal

- Scrape out any carbon and clean the valves and the operating rod with high-flash point solvent.

**WARNING**

○**Clean the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

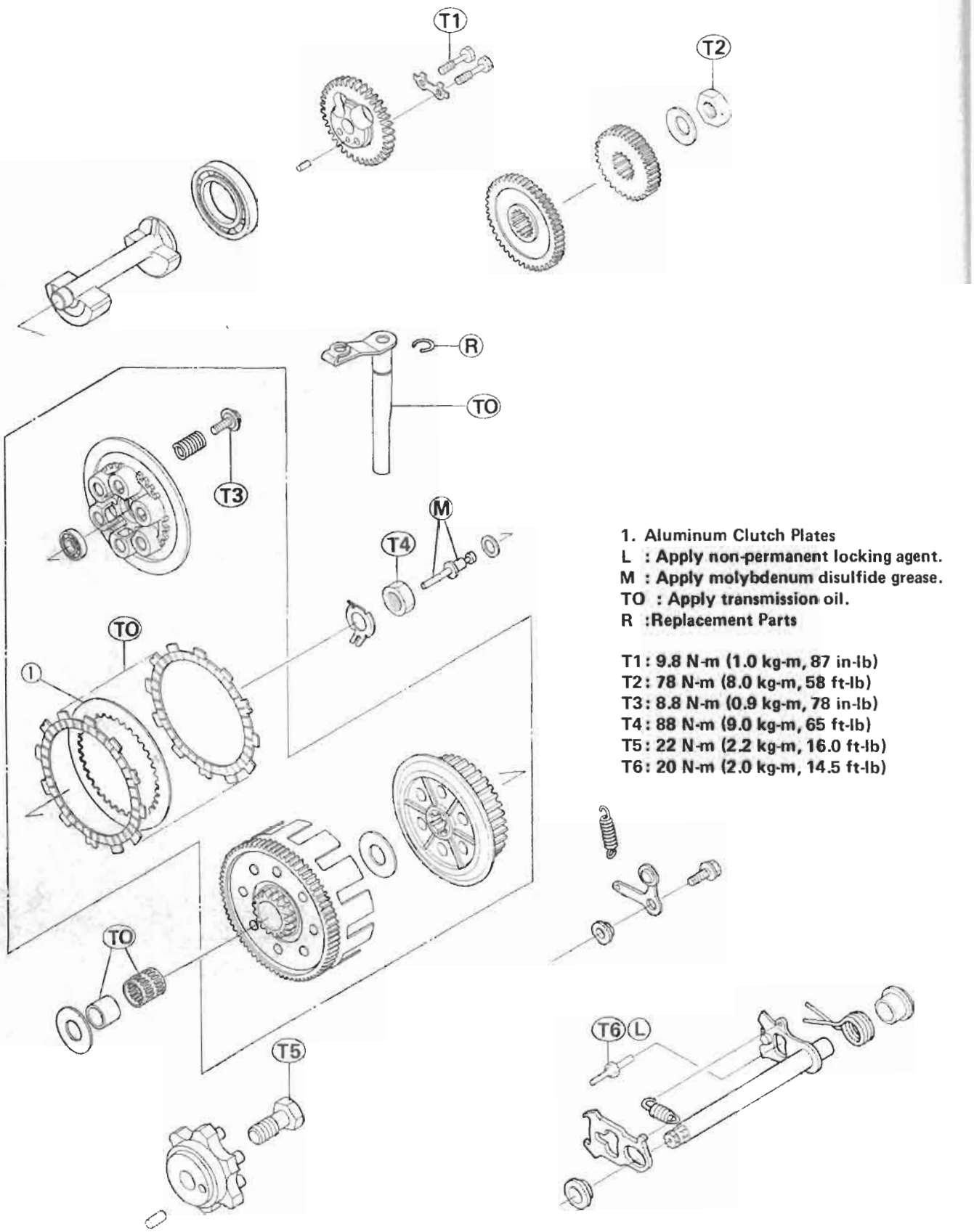
# Engine Right Side

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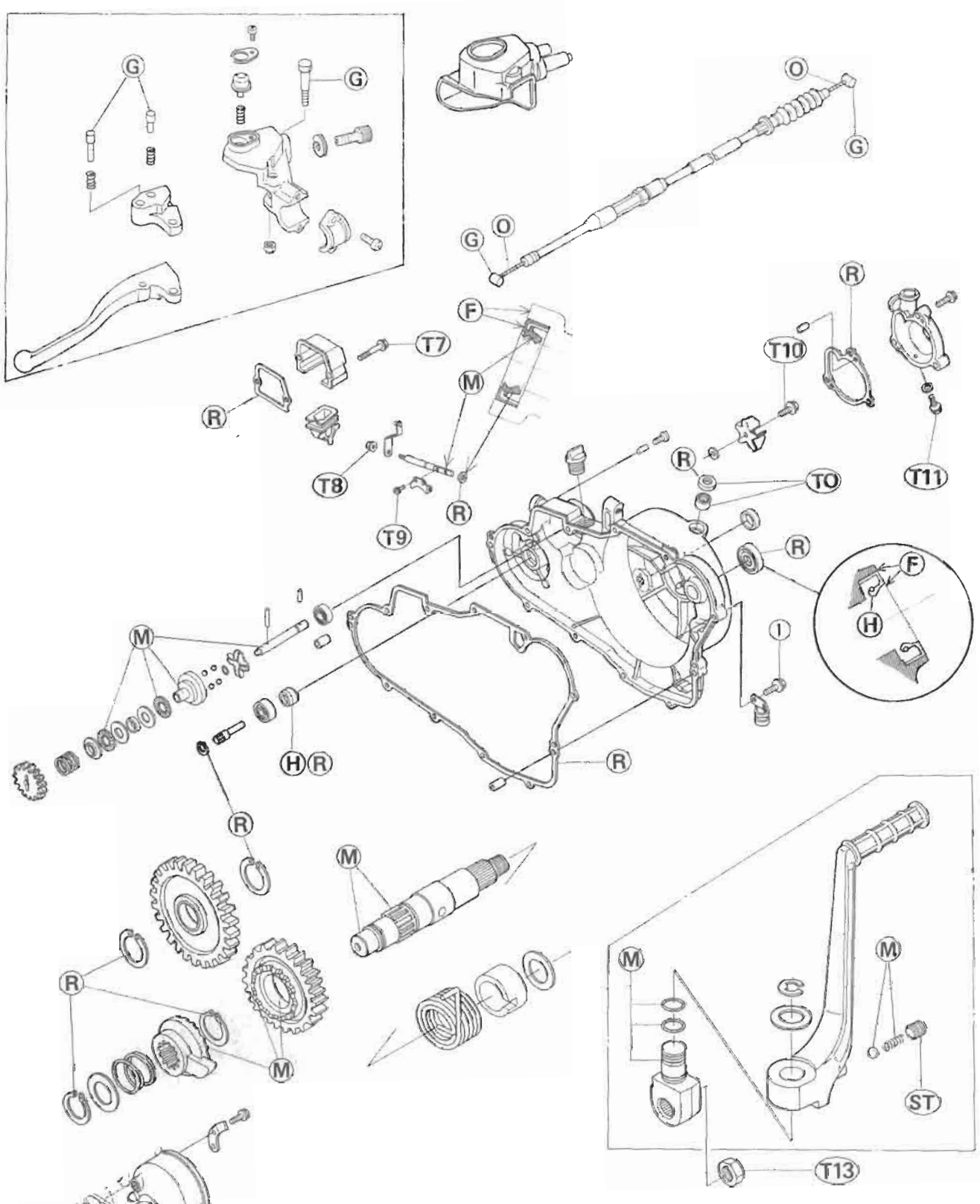

5

## Exploded View




1. Aluminum Clutch Plates
L : Apply non-permanent locking agent.
M : Apply molybdenum disulfide grease.
TO : Apply transmission oil.
R :Replacement Parts

T1 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T2 : 78 N-m (8.0 kg-m, 58 ft-lb)
T3 : 8.8 N-m (0.9 kg-m, 78 in-lb)
T4 : 88 N-m (9.0 kg-m, 65 ft-lb)
T5 : 22 N-m (2.2 kg-m, 16.0 ft-lb)
T6 : 20 N-m (2.0 kg-m, 14.5 ft-lb)




F : Flush with the surfaces.
G : Apply grease.
H : Apply high temperature grease.
M : Apply molybdenum disulfide grease.
O : Apply oil.
R : Replacement Parts
ST: Stake the fasteners.
TO : Apply transmission oil.

1. Bolts 6 x 25
T7 : 4.9 N-m (0.5 kg-m, 43 in-lb)
T8 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T9 : 3.9 N-m (0.4 kg-m, 35 in-lb)
T10 : 6.9 N-m (0.7 kg-m, 61 in-lb)
T11 : 7.8 N-m (0.8 kg-m, 69 in-lb)
T12 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T13 : 25 N-m (2.5 kg-m, 18.0 ft-lb)

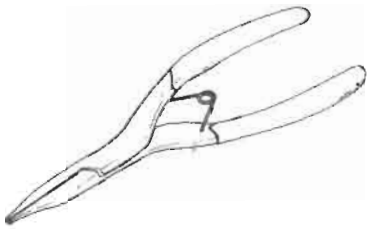
## 5-4 ENGINE RIGHT SIDE

### Specifications

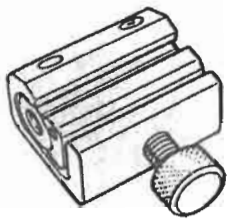
| Item | Standard | Service Limit |
|---|---|---|
| **Transmission Oil:** | | |
| Oil level | Between upper and lower levels | |
| Grade | SE or SF class | |
| Viscosity | SAE 10W-30 or 10W-40 | |
| Amount | 1.15 L | |
| **Clutch:** | | |
| Clutch lever free play | 2 – 3 mm | – – – |
| Clutch release lever angle | 80 – 90° | – – – |
| Clutch spring free length | 33.3 mm | 32.3 mm |
| Friction plate thickness | 2.92 – 3.08 mm | 2.80 mm |
| Friction and steel plate warp | 0.2 mm or under | 0.3 mm |

### Special Tools

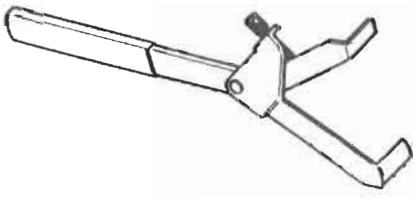
**Outside Circlip Pliers: 57001-144**



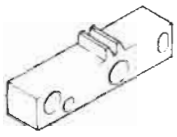
**Pressure Cable Luber: K56019-021**



**Clutch Holder : 57001-1243**



**Gear Holder: 57001-302**



**Bearing Driver Set: 57001-1129**



## Transmission Oil

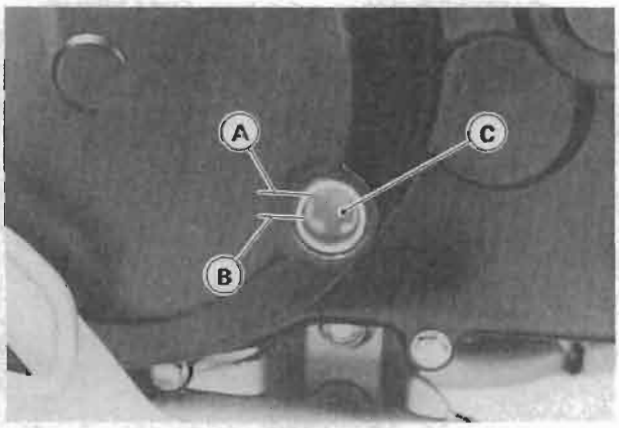
In order for the transmission and clutch to function properly, always maintain the transmission oil at the proper level and change the oil in accordance with the Periodic Maintenance Chart (see General Information chapter).

**WARNING**

○**Vehicle operation with insufficient, deteriorated, or contaminated transmission oil will cause accelerated, wear and may result in transmission seizure, accident, and injury.**

### *Oil Level Inspection*

- If the vehicle has just been used, wait several minutes for all the oil to drain down.
- If the oil has been poured in since the vehicle was last used, kick the engine over 3 or 4 times with the ignition switch left in the OFF position. This ensures that the oil will "settle".
- Situate the vehicle so that it is perpendicular to the ground.
- Check the oil level through the oil level gauge.
- ★The oil level should come up between the upper and lower levels.




A. Upper Level
B. Lower Level
C. Oil Level Gauge

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

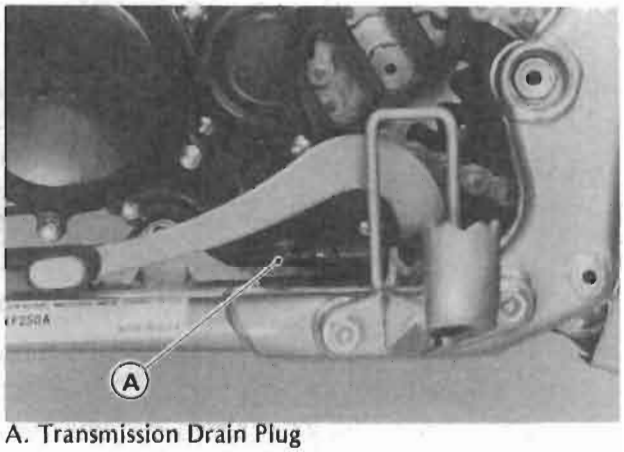
★If the oil level is too low, add oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

**NOTE**

○*If the oil must be refilled but the type and brand of the oil that already is in the engine are unidentified, change the oil in the engine completely.*

### *Oil Changing*

- Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily. Then stop the engine.
- Place an oil pan beneath the engine.
- Remove the transmission drain plug.
- Remove the oil filler opening plug.




A. Transmission Drain Plug

- With the vehicle perpendicular to the ground, let the oil completely drain.
- After the oil has completely drained, install the drain plug with its gasket. Proper torque for it is shown in Exploded View.

**NOTE**

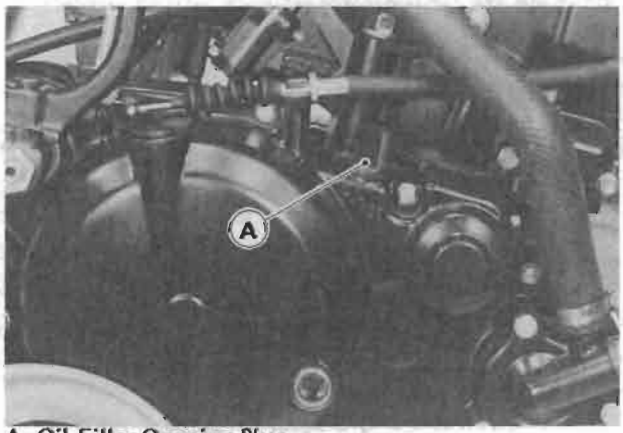
○*Replace the damaged gasket with a new one.*

- Fill the engine up to the proper level with the transmission oil specified in the table.
- Check the oil level after kicking the engine over 3 or 4 times with the ignition switch left in the OFF position.

**Transmission Oil**

| | | |
|---|---|---|
| **Grade** | : | **SE or SF class** |
| **Viscosity** | : | **SAE 10W-30 or 10-40** |
| **Capacity** | : | **1.15 L** |

- Install the oil filler opening plug.

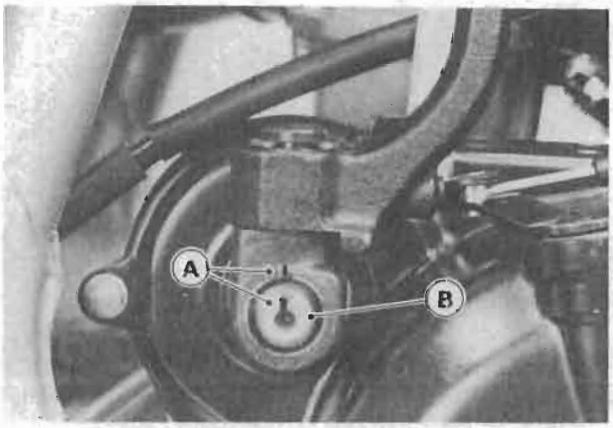



A. Oil Filler Opening Plug

## Right Engine Cover

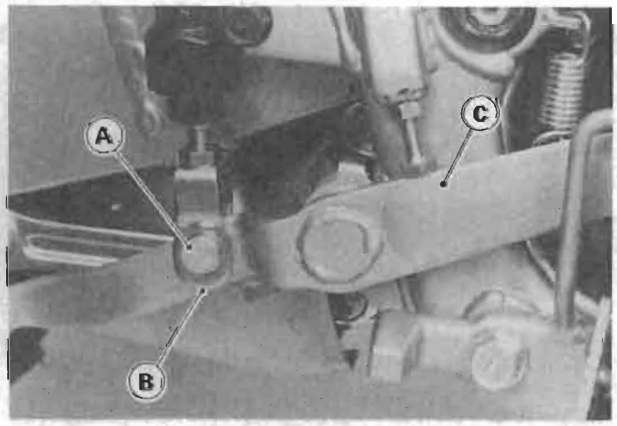
### *Right Engine Cover Removal*

- Drain the coolant (see the Cooling System chapter).
- Drain the transmission oil (see Oil Changing).
- Remove the following parts.
  - Right Foot Peg
  - Clutch Cable Lower End
  - Water Pump Cover (see the Cooling System chapter).
- Mark the position of the kick pedal so that it can be installed later in the same position.



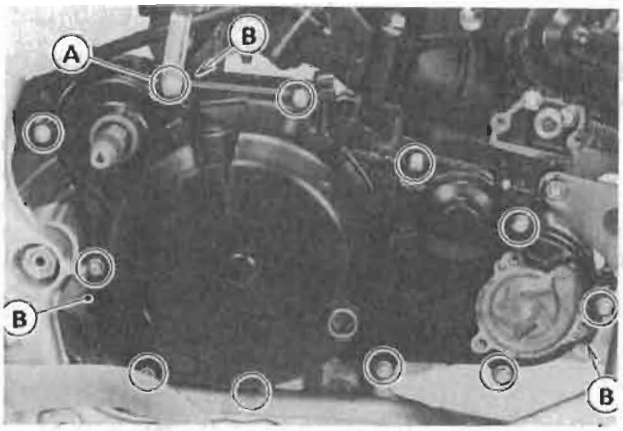

A. Marks B. Kick Shaft

- Remove the kick pedal mounting nut and remove the kick pedal.
- Remove the brake return spring.
- Remove the brake pedal pin joint and remove the pedal lever end from the clevis.




A. Pin Joint C. Brake Pedal
B. Clevis

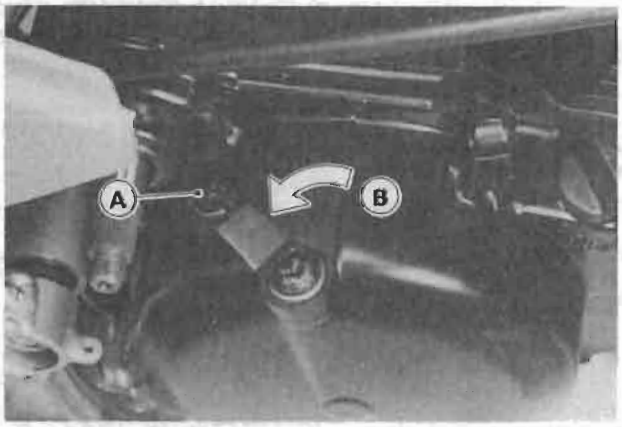
- Depress the pedal by hand as far as it will go.
- Take out the right engine cover mounting bolts.




A. Mounting Bolts (11) B. Pry Points

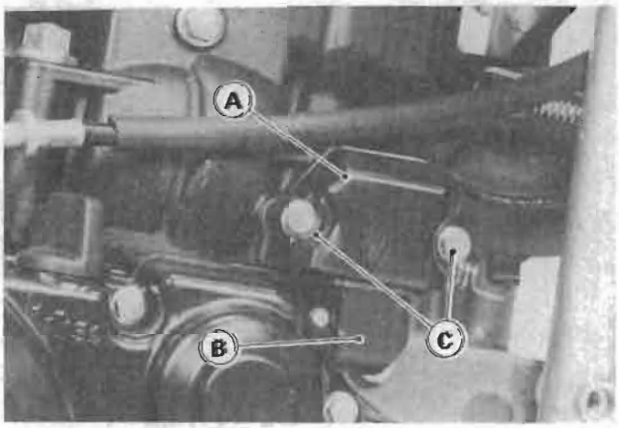
- Turn the clutch release lever counterclockwise about 90° and take off the right engine cover.

○Be careful not to damage the painted surface of the cover with the brake pedal.




A. Release Lever B. Turn about 90°

- Remove the KIPS governor lever cover and boot from the cylinder and the right engine cover.

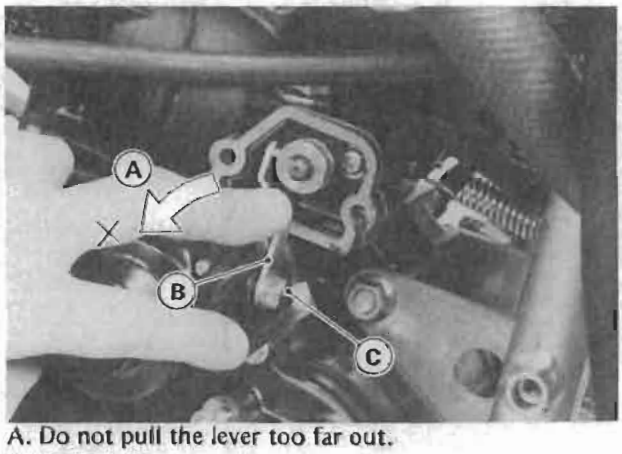



A. Governor Lever Cover C. Bolts
B. Governor Lever Boot

●Remove the governor lever mounting nut, and take off the outside governor lever.
○Be careful not to pull the outside governor lever too far out when removing the nut.

**CAUTION**

**○Pulling the lever too far out may upset the ball arrangement in the governor holder, and the governor assembly may need to be disassembled.**




A. Do not pull the lever too far out.
B. Outside Governor Lever
C. Nut

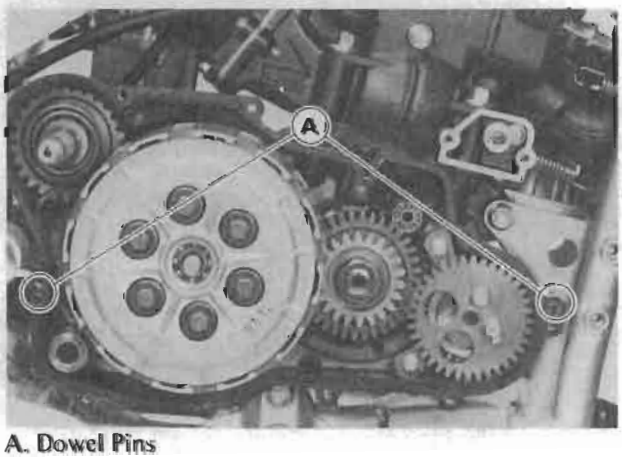
**NOTE**

○*It is not necessary to remove the clutch release shaft and water pump assembly for right engine cover removal.*

●Remove the right engine cover with the governor assembly and shaft, and the water pump assembly left installed.

### *Right Engine Cover Installation Notes*

●Assemble the following parts in the right engine cover.
KIPS Governor Assembly and Lever Shaft
Water Pump Assembly.
●Check that the dowel pins are in place, and fit a new gasket on the crankcase.

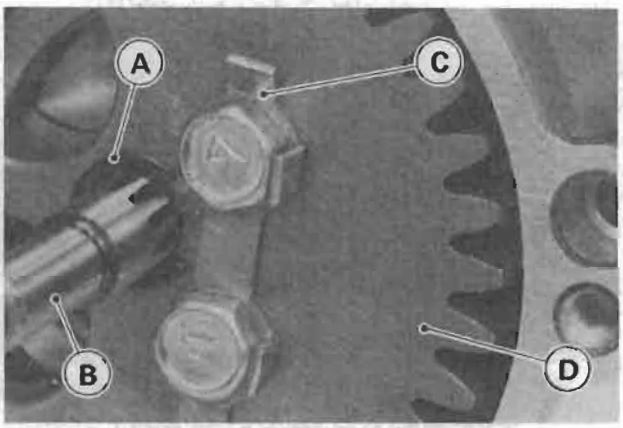



A. Dowel Pins

●Locate the circlip on the water pump shaft so that the opening faces the lockplate on the balancer shaft gear.

**NOTE**

○*This prevents the circlip from contacting the lockplate.*

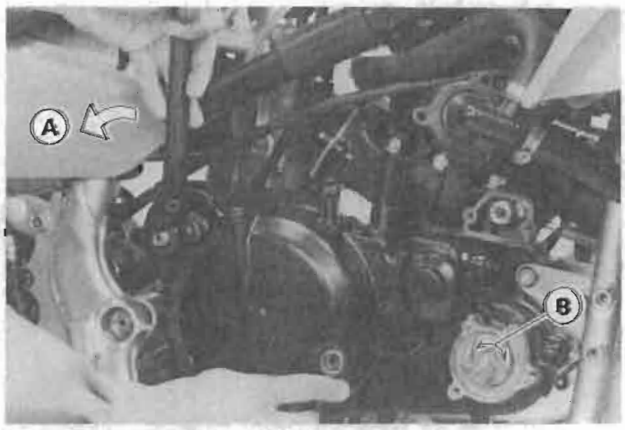



A. Circlip
B. Water Pump Shaft
C. Lockplate
D. Balancer Shaft Gear

●Install the right engine cover halfway and install the kick pedal.
●When installing the kick pedal, align the kick pedal mark with the mark on the kick shaft (the marks were made during removal).
●Tap the right engine cover lightly while pushing down the kick pedal by hand a little at a time in order to mesh KIPS governor gear with the crankshaft balancer gear. And then, turn the water pump impeller a little at a time in order to fit the water pump shaft spline into the balancer gear spline.

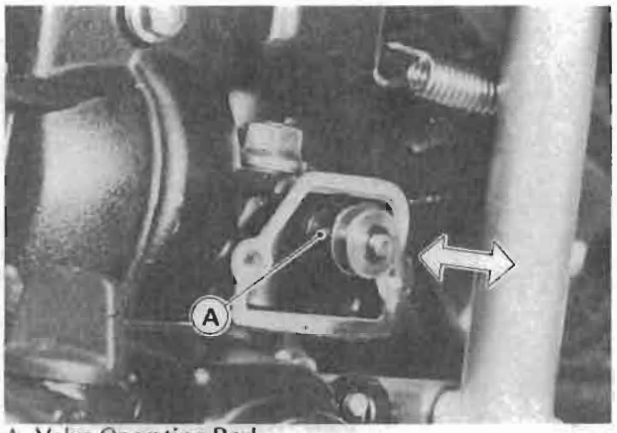
**CAUTION**

**○Do not force the right engine cover or you may damage the KIPS governor plastic gear.**



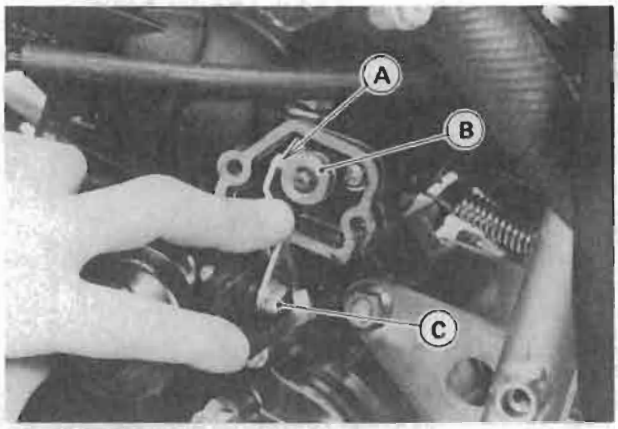

A. Push down the kick lever.
B. Turn the water pump impeller.

- Tighten the cover mounting bolts securely.
- Apply molybdenum disulfide grease to the KIPS valve operating rod.
- Check that the rod in the cylinder moves smoothly back and forth.



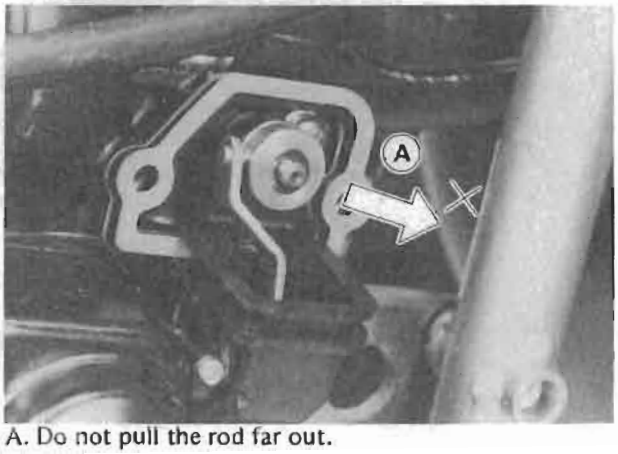

A. Valve Operating Rod

- Insert the outside governor lever in the boot and install them on the governor shaft.
- With the rod pushed in fully, insert the governor lever pin in the rod collar and tighten the lever mounting nut to the specified torque (see Exploded View).




A. Lever Pin
B. Collar
C. Nut

○**When installing the lever mounting nut, do not pull the rod too far out.**




A. Do not pull the rod far out.

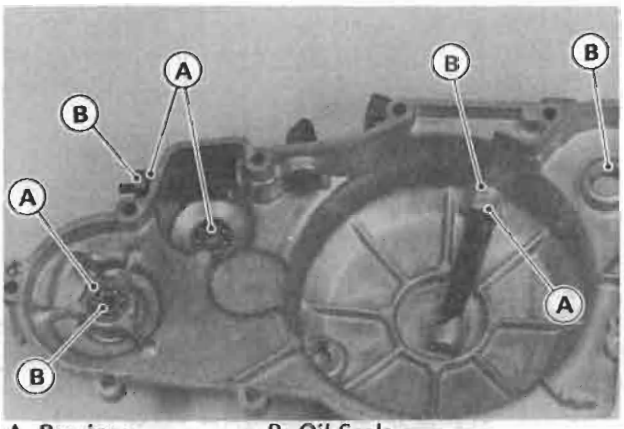
**CAUTION**

○**Pulling the rod too far out may upset the ball arrangement in the governor holder, and the governor assembly may need to be disassembled.**

- Push down the kick pedal a few times by hand to check that the kick shaft turns smoothly.
- Install the governor lever cover and tighten the mounting bolts to **4.9 N-m (0.5 kg-m, 43 in-lb)** of torque.
- Install the following parts in the original position.
  Water Pump Cover
  Rear Brake Pedal (see Rear Brake Pedal Installation Notes in the Brakes chapter)
  Right Foot Peg (see Exploded View in the Frame chapter)
- Fill the crankcase with transmission oil (see Oil Changing).
- Fill the engine with coolant (see Coolant Changing in the Cooling System chapter).

### *Right Engine Cover Disassembly Notes*

- Refer to the Cooling System chapter for water pump oil seal and ball bearing removal.
- Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required (see Clutch Release Lever Removal).
- Using a suitable hook, puller, or metal rod, remove the oil seal, the ball bearing, and/or the needle bearing.




A. Bearings
B. Oil Seals

**NOTE**

○*In the absence of the above mentioned tools, satisfactory results may be obtained by heating the cover to approximately 93°C (200°F) max., and pulling the bearing out.*

**CAUTION**

○**Do not heat the cover with a torch. This will warp the cover. Soak the cover in oil and heat the oil.**

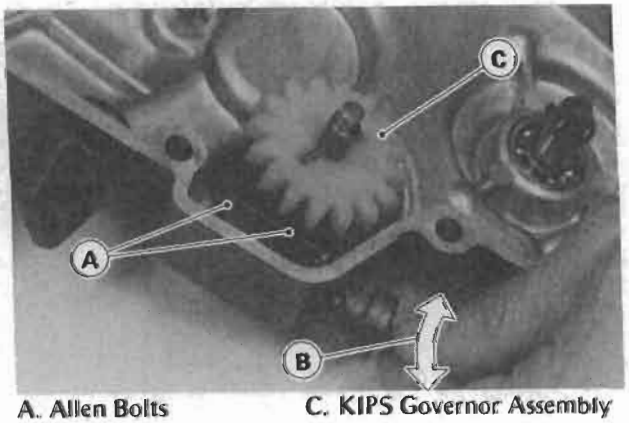
### *Right Engine Cover Assembly Notes*

- Any oil seal that is removed is damaged and must be replaced with a new one.
- Be certain that all parts are cleaned thoroughly before assembly.
- Refer to the Cooling System chapter for water pump oil seal and ball bearing installation.
- Install the governor ball bearing and clutch lever needle bearing with a press and the bearing driver set (special tool: PN 57001-1129) until they bottom out. Face the marked side outboard.
- Install the oil seals using a press and the bearing driver set (special tool) until the end is flush with the boss surface.
- Apply high temperature grease to the lips of the new oil seal and needle bearing.

## KIPS Governor

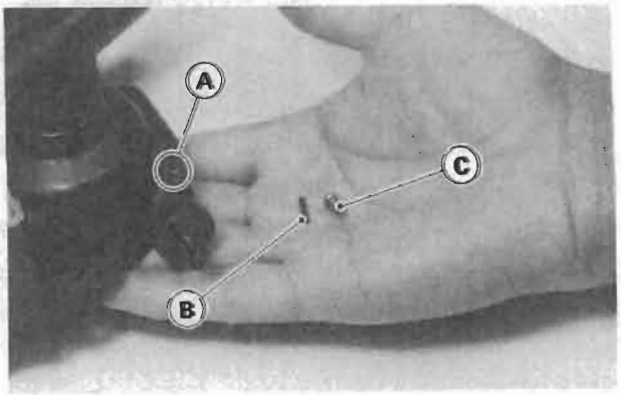
### *KIPS Governor Removal*

- Remove the right engine cover (see Right Engine Cover Removal).
- Turn the governor lever shaft and pull the KIPS governor assembly out of the right engine cover.



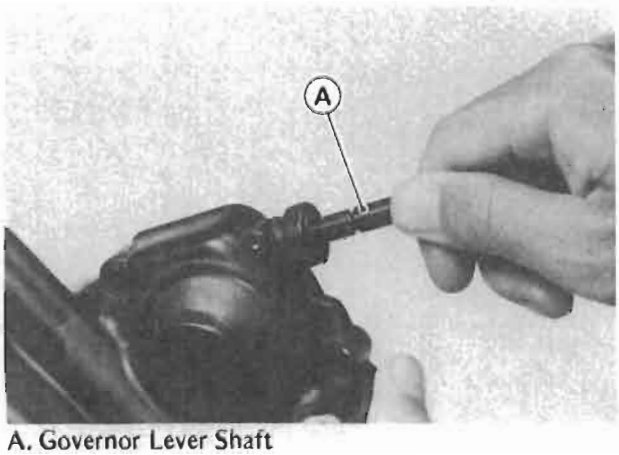

A. Allen Bolts
B. Turn the lever shaft.
C. KIPS Governor Assembly

- If necessary remove the screw holding the shaft and take the pin out.




A. Hole
B. Pin
C. Screw

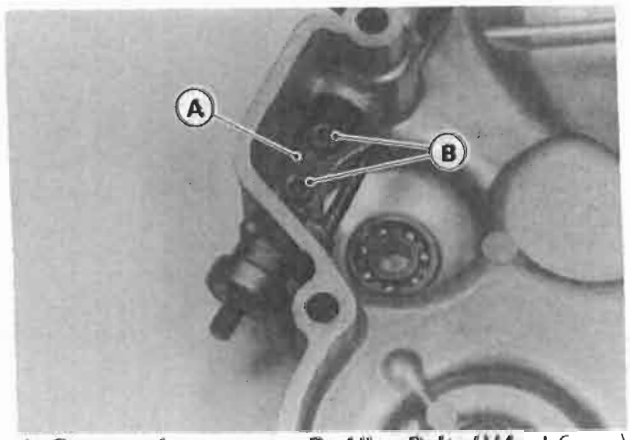
- Remove the two Allen bolts on the shaft and take off the governor lever.
- Pull the lever shaft out.




A. Governor Lever Shaft

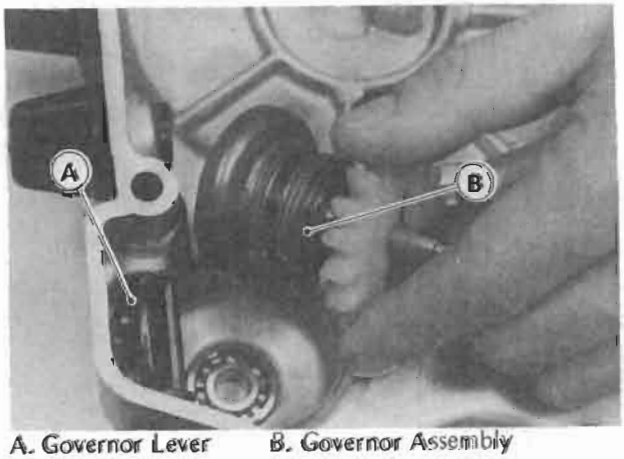
### *KIPS Governor Installation Notes*

- Install the KIPS governor lever on the shaft with two Allen bolts and tighten the bolts to the specified torque (see Exploded View).




A. Governor Lever
B. Allen Bolts (M4 x L6 mm)

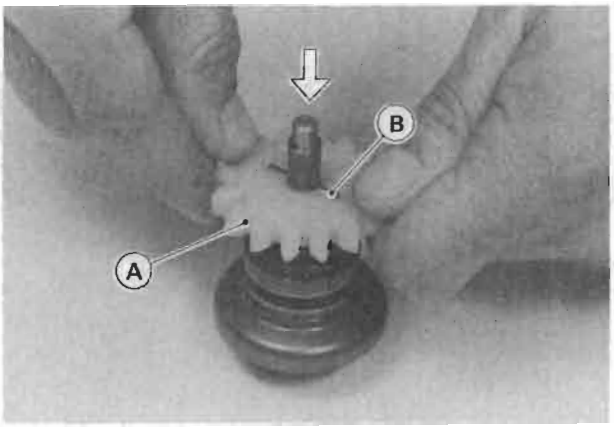
- Fit the governor assembly into the ball bearing and insert the governor lever between the thrust washers.




A. Governor Lever
B. Governor Assembly

### *KIPS Governor Disassembly Notes*

●Remove the KIPS governor (see KIPS Governor Removal).
●Push the governor gear down and pull the pin out.



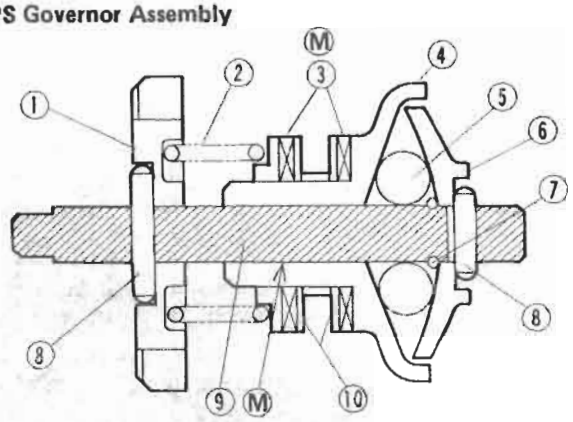

A. Governor Gear B. Pin

●Remove the O-ring and slide out the governor guide. Replace the O-ring with a new one.

### *KIPS Governor Assembly Notes*

●Apply molybdenum disulfide grease to the thrust bearings and the governor shaft.

**KIPS Governor Assembly**

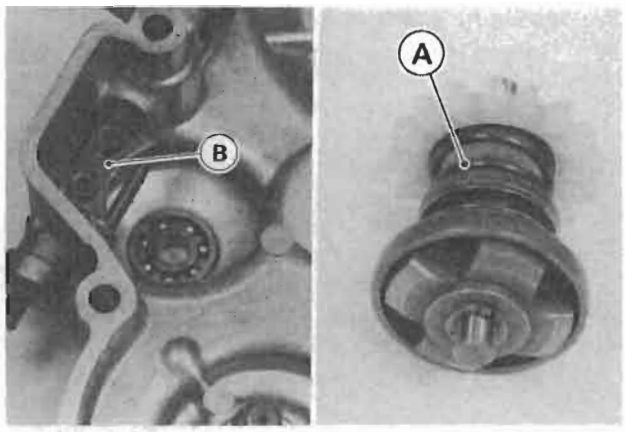



**M : Apply molybdenum disulfide grease.**

1. Governor Gear
2. Governor Spring
3. Thrust Bearings
4. Governor Ball Holder
5. Balls
6. Governor Guide
7. O-Ring
8. Pins
9. Governor Shaft
10. Thrust Washers

### *KIPS Governor Inspection*

●Check the KIPS governor assembly, the governor lever and shaft for signs of damage.
★If necessary, replace them with new ones.




A. KIPS Governor Assembly
B. Governor Lever and Shaft

## Clutch

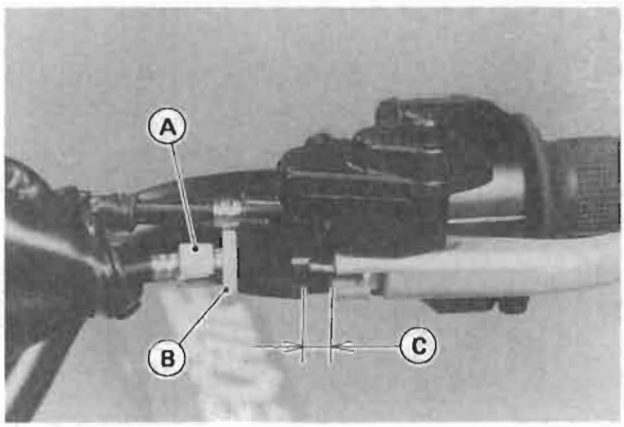
Due to friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

### *Clutch Lever Free Play Inspection*

●Check that the clutch lever has the specified amount of free play as shown.

**Clutch Lever Free Play**

**2 – 3 mm**




A. Adjuster C. Free Play
B. Knurled Locknut

★If it does not, adjust the lever play as follows.

### *Clutch Lever Free Play Adjustment*

- Slide the dust cover at the clutch lever out of place.
- Loosen the knurled locknut at the clutch lever.
- Turn the adjuster so that the clutch lever will have the specified amount of free play.

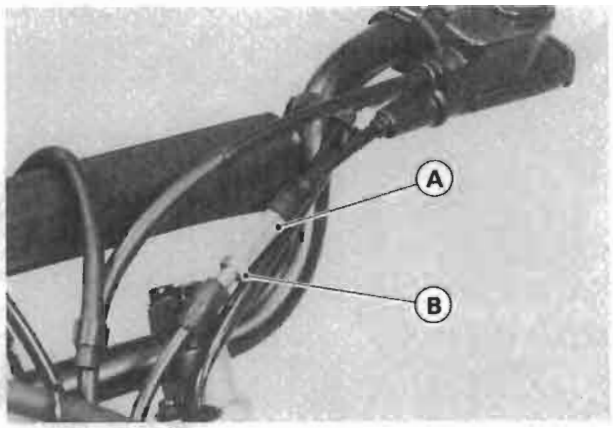
**WARNING**

○**Be sure to the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement, resulting in a hazardous riding condition.**

- Tighten the locknut.
- Slide back the dust cover.

★If the adjuster at the clutch lever has reached its limit, use the adjusting nut in the middle of the cable.

- Loosen the knurled locknut at the clutch lever.
- Turn the adjuster in all the way, then tighten the knurled locknut.
- Loosen the locknut in the middle of the cable, and turn the adjusting nut so that clutch lever has the specified amount of free play.




A. Adjusting Nut B. Locknut

- Tighten the locknut.
- Slide the dust cover back in place.
- After the adjustment is made, start the engine and check that the clutch does not slip and that it releases properly.

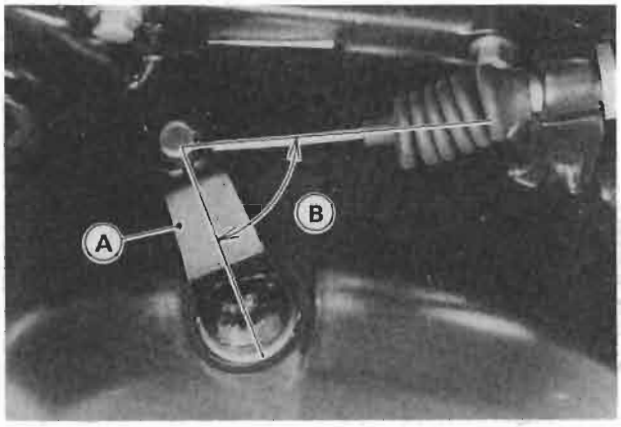
### *Clutch Release Lever Angle Inspection and Adjustment*

If the clutch slips or the action at the lever feels heavy despite proper clutch lever free play adjustment, inspect and adjust the clutch release lever angle.

- Loosen the nuts, and slide the adjuster to give the cable plenty of play.
- Turn the clutch release lever until it becomes hard to turn. This is the point where the clutch is just starting to release. At this time, check that the clutch release lever to clutch cable angle is the specified amount.

**Clutch Release Lever Angle**

**Standard:** **80 – 90°**




A. Cltuch Release Lever B. 80 – 90°

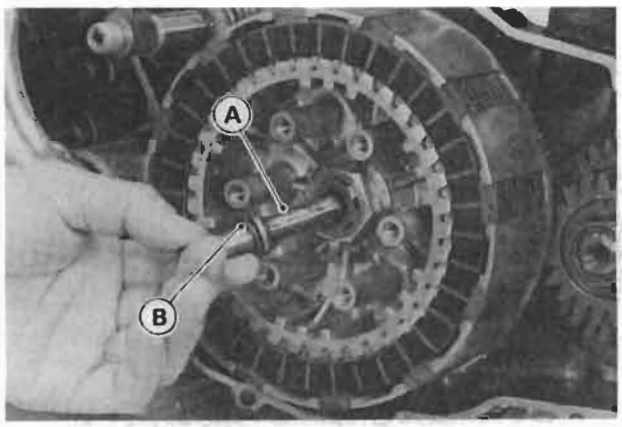
★If it is not, adjust the clutch lever angle as follows.

○Check if the clutch release angle is more than **90°**, or less than **80°**.

○Remove the right engine cover (see Right Engine Cover Removal).

☆If the release lever angle is more than **90°**, add the one shim on the spring plate.

○Install the shim on the outside of the pusher.




A. Spring Plate Pusher B. Shim

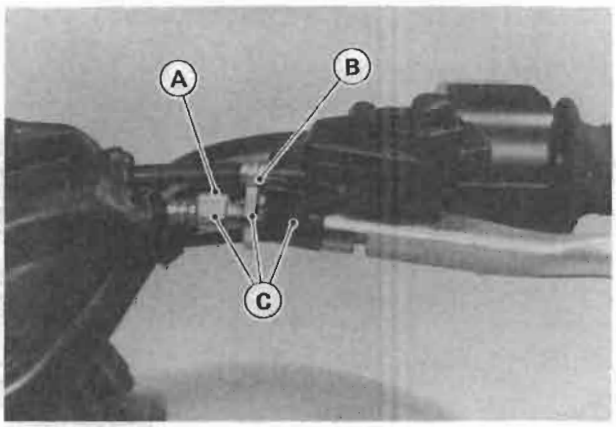
☆If the lever angle is less than **80°**, take off the one shim.

**NOTE**

○*There must be at most two shims placed on the pusher. If more than two shims are needed for adjustment, check the clutch plates.*

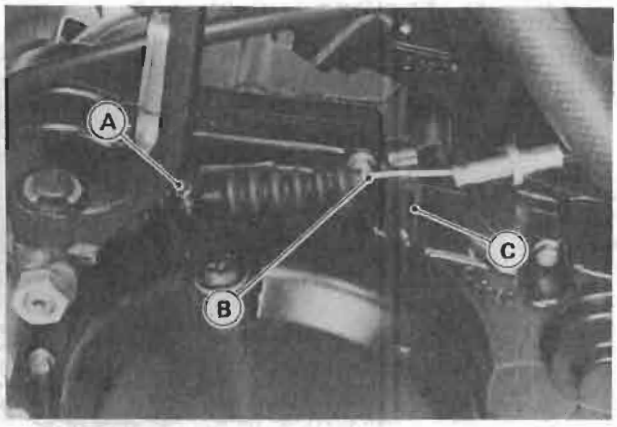
### *Clutch Cable Removal*

- Slide the dust cover in the middle of the clutch cable out of place.
- Loosen the locknut in the middle of the cable and screw in the adjusting nut to give the cable plenty of play.
- Slide the dust cover at the clutch cable top end out of place.
- Loosen the knurled locknut at the clutch lever, and screw in the adjuster.
- Line up the slots in the clutch lever, knurled locknut, and adjuster, and then free the cable from the lever.




A. Adjuster
B. Knurled Locknut
C. Slots

- Slide the dust cover at the cable lower end out of place, then pull the outer cable forward to slip the inner cable out of the slot in the stay.
- Free the clutch inner cable tip from the clutch release lever.




A. Cable Tip
B. Inner Cable
C. Stay

### *Clutch Cable Installation Note*

- Run the clutch cable according to the Cable and Harness Routing section in the General Information chapter.

### *Clutch Cable Lubrication*

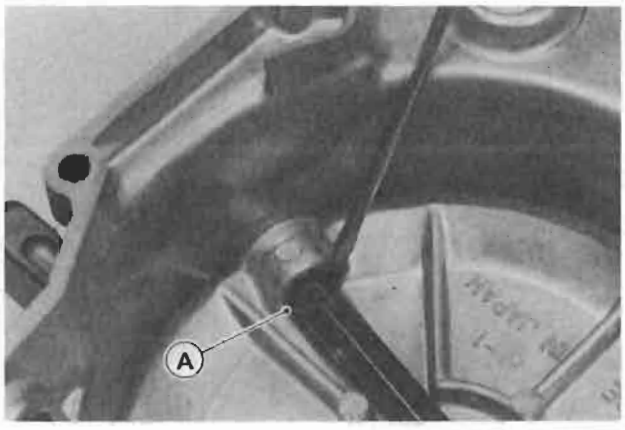
- Lubricate the clutch cable using the pressure cable luber (special tool: PN K56019-021) in accordance with the Periodic Maintenance Chart (see General Lubrication in the Appendix chapter).

### *Clutch Release Lever Removal*

**CAUTION**

- **Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.**

- Remove the right engine cover (see Right Engine Cover Removal).
- Remove the stop ring and pull the lever out.




A. Stop Ring

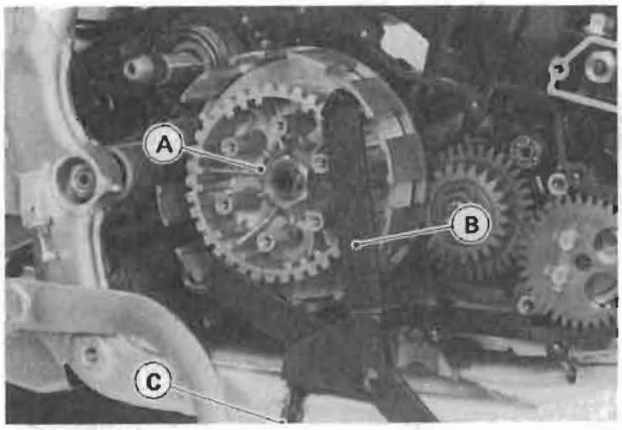
### *Clutch Release Lever Installation Note*

- Installation is the reverse of removal. Note the following.
- Before installing the lever and shaft assembly, check the oil seal and replace it if damaged.
- Apply oil to the lever shaft and the oil seal lips at installation.

### *Clutch Removal*

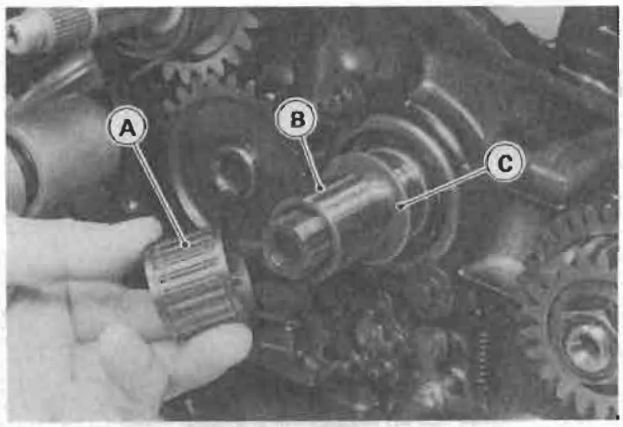
- Remove the right engine cover (see Right Engine Cover Removal).
- Remove the clutch spring bolts, washers, and springs, then take off the clutch spring plate.
- Remove the following parts.
  Clutch Spring Bolts, Washers and Clutch Springs
  Clutch Spring Plate, Clutch Pusher and Shim
  Friction Plates and Aluminum Plates

•Bend the lockwasher tab up.
•Use the clutch holder (special tool) to hold the clutch hub. Remove the clutch hub nut and lockwasher.
•Tighten the holder bolt securely.



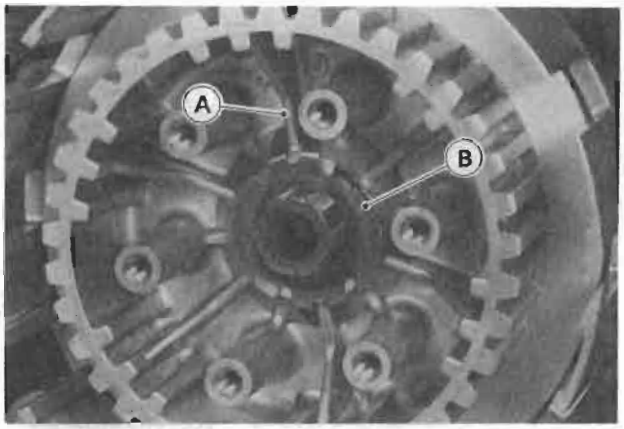

A. Clutch Hub Nut
B. Clutch Holder: 57001-1243
C. Holder Bolt

•Remove the following parts.
Clutch Hub and Washer
Needle Bearing, Sleeve, Clutch Housing and Thrust Washer




**A. Needle Bearing** **C. Thrust Washer**
B. Sleeve

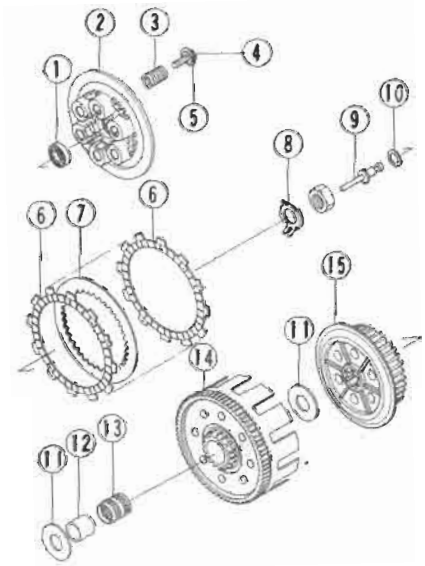
*Clutch Installation Notes*
•Apply molybdenum disulfide grease to the outside of the sleeve.
•Install the lockwasher fitting the clutch hub ribs into the notches in the washer.




**A. Clutch Hub Ribs** **B Lockwasher**

•Tighten the hub nut to the specified torque (see Exploded View) using the clutch holder (special tool: PN 57001-1243).
•Bend the lockwasher tab over the hub nut.
•Install the friction plates and aluminum plates, starting with a friction plate and alternating them.

**Clutch Installation**

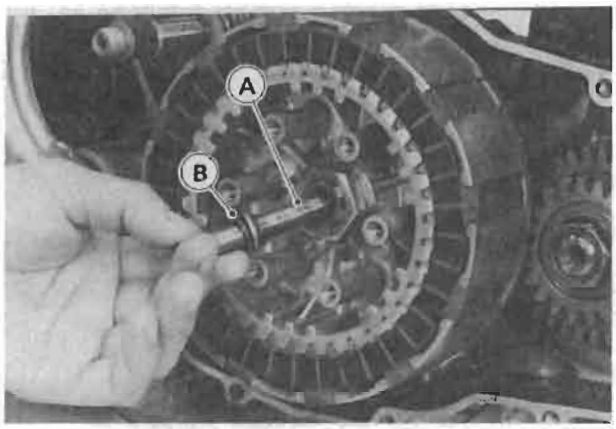



1. Bearing
2. Spring Plate
3. Clutch Springs
4. Bolts
5. Washers
6. Friction Plates
7. Aluminum Plates
8. Lockwasher
9. Pusher
10. Shim
11. Thrust Washers
12. Collar
13. Needle Bearing
14. Clutch Housing
15. Clutch Hub

**CAUTION**

**If new dry aluminum plates and friction plates are installed, apply transmission oil to the surfaces of each plate to avoid clutch plate seizure.**

•Apply molybdenum disulfide grease to the spring plate pusher, and install the pusher and pusher shim.

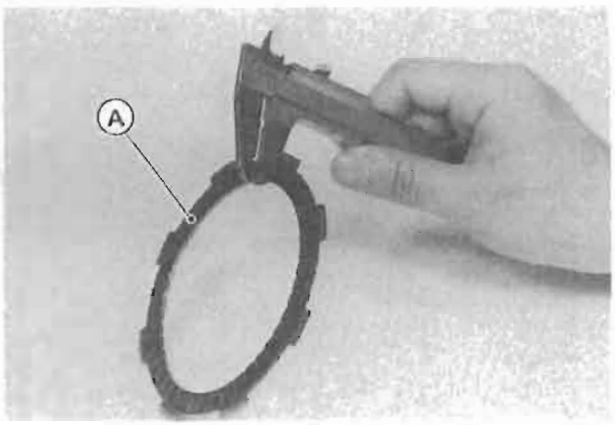



A. Spring Plate Pusher B. Pusher Shim

•Install the spring plate after installing the pusher.
•Tighten the clutch spring bolts evenly to the specified torque (see Exploded View).

*Friction Plate Wear and Damage Inspection*

•Visually inspect the friction plates to see if they show any signs of seizure, overheating, or uneven wear.
★If any plates shown signs of damage, or if they have worn past the service limit, replace the friction plates and aluminum plates as a set.



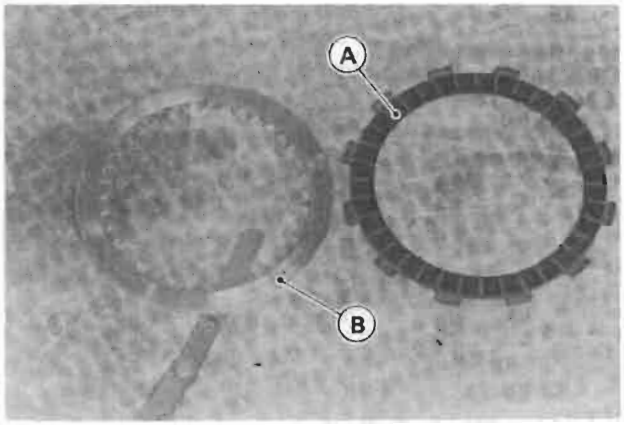

A. Friction Plate

**Friction Plate Thickness**

| | |
|---|---|
| **Standard:** | **2.92 – 3.08 mm** |
| **Service Limit:** | **2.80 mm** |

*Friction and Aluminum Plate Warp Inspection*

•Place each friction plate or aluminum plate on a surface plate, and measure the gap between the surface plate and each friction plate or aluminum plate. The gap is the amount of friction or aluminum plate warp.
★If any plate is warped over the service limit, replace it with a new one.

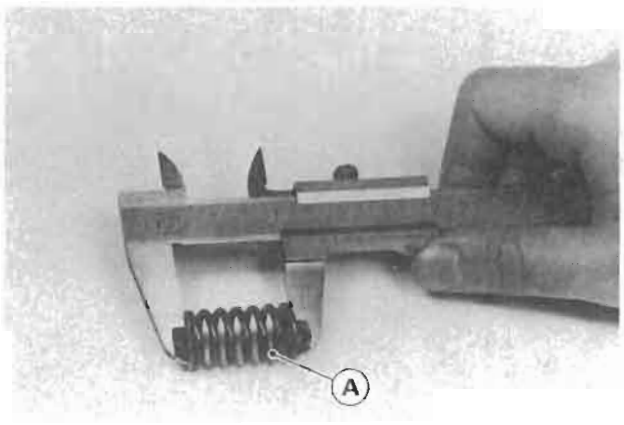



A. Friction Plate B. Aluminum Plate

**Friction and Aluminum Plate Warp**

| | |
|---|---|
| **Standard:** | **0.2 mm or under** |
| **Service Limit:** | **0.3 mm** |

*Clutch Spring Free Length Measurement*



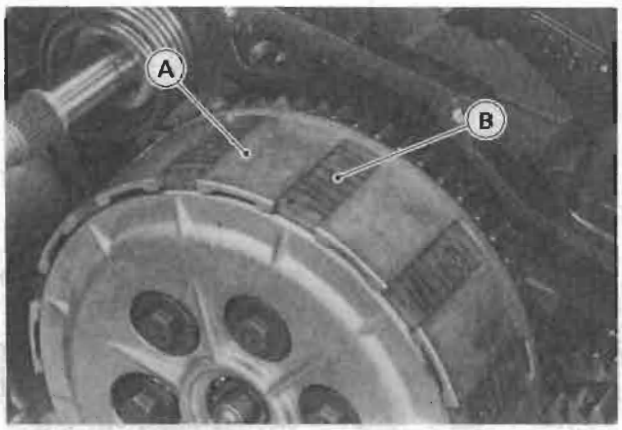

A. Clutch Spring

**Clutch Spring Free Length**

| | |
|---|---|
| **Standard:** | **33.3 mm** |
| **Service Limit:** | **32.3 mm** |

### *Clutch Housing Finger Inspection*

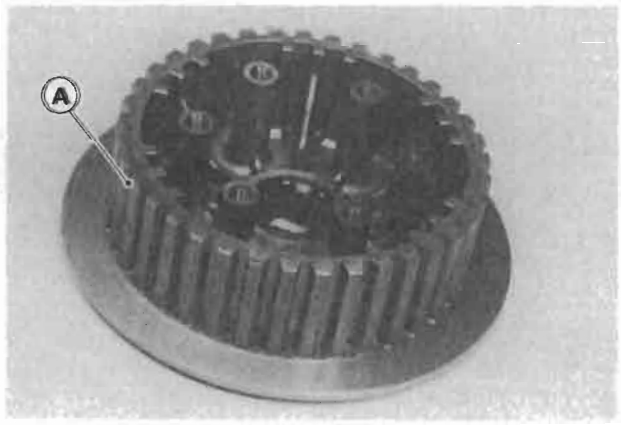
- Visually inspect the fingers of the clutch housing where the tangs of the friction plates hit them.
- ★If they are badly worn or if there are groove cut where the tangs hit, replace the housing. Also replace the friction plates if their tangs are damaged.




A. Clutch Housing Finger B. Friction Plate Tang

### *Clutch Hub Spline Inspection*

- Visually inspect where the teeth on the aluminum plates wear against the splines of the clutch hub.
- ★If there are notches worn into the splines, replace the clutch hub. Also, replace the aluminum plates if their teeth are damaged.




A. Clutch Hub Spline

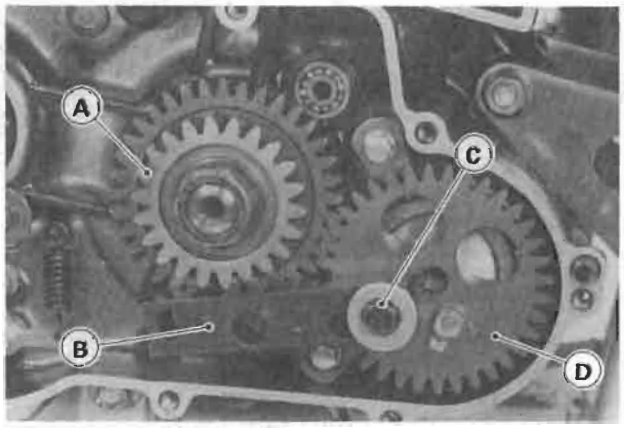
## Primary Gear and Crankshaft Balancer Gear

### *Primary Gear and Crankshaft Balancer Gear Removal*

- Remove the following parts.
  Right Engine Cover
  One of Balancer Shaft Gear Mounting Bolts
- Install the gear holder (special tool) using a suitable bolt (M6 x P1.0 x about 50 mm long) and washer on the balancer shaft gear, then hold the primary gear.

**NOTE**

○*With suitable bolt and washer installed on the gear holder, the bolt end must project about 29 – 35 mm.*

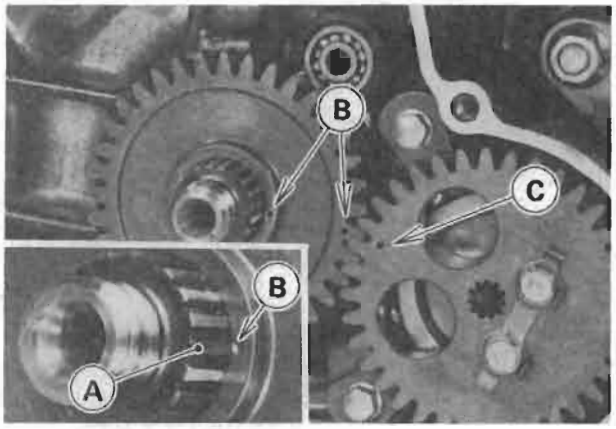



A. Primary Gear
B. Gear Holder: 57001-302
C. Suitable Bolt and Washer
D. Balancer Shaft Gear

- Pull the primary gear out.
- Remove the crankshaft balancer gear if necessary.

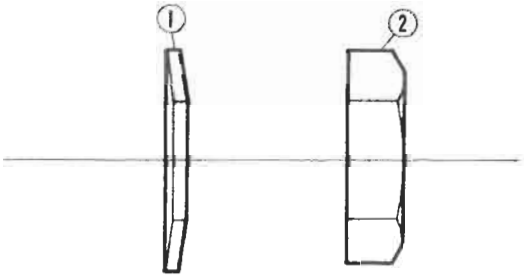
### *Primary Gear and Crankshaft Balancer Gear Installation*

- Face the punch marks on the crankshaft balancer gear outboard.
- Install the crankshaft balancer gear aligning the punch marks on the gear with the notch on the crankshaft spline and the punch mark on the balancer shaft gear.



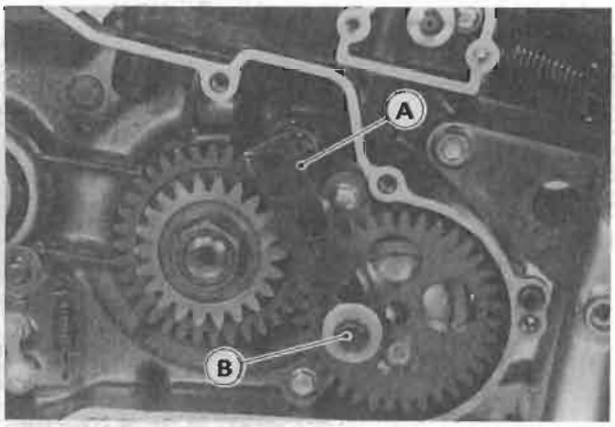

A. Notch
B. Punch Marks on Crankshaft Balancer Gear
C. Punch Mark on Balancer Shaft Gear

- Install the primary gear. Either side of the gear may face outboard.
- Install the spring washer and primary gear nut as shown.




1. Spring Washer
2. Primary Gear Nut

- Tighten the primary gear nut to the specified torque (see Exploded View) using the gear holder (special tool) and the suitable bolt and washer (used during removal).




A. Gear Holder: 57001-302
B. Suitable Bolt and Washer

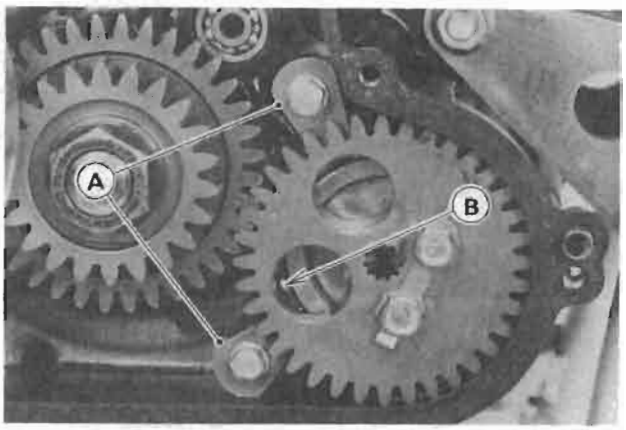
- Remove the gear holder (special tool) and install the balancer shaft gear bolt.
- Tighten the balancer shaft gear bolts to the specified torque (see Exploded View) and bend the lockwasher tabs over the bolts.

## Balancer Shaft

The balancer shaft assembly contains the balancer shaft, balancer shaft bearing and balancer gear. The assembly can be removed with the engine installed in the frame.

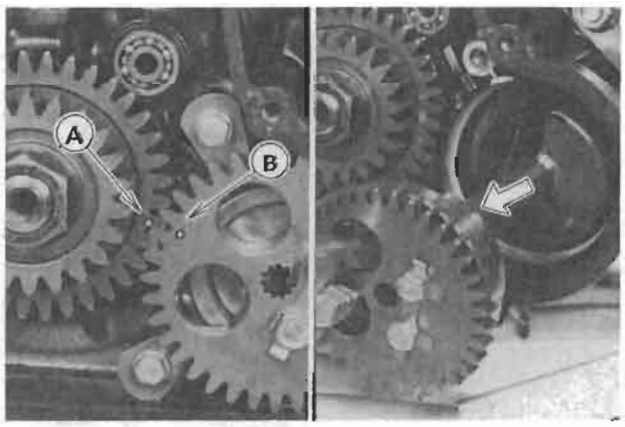
### *Balancer Shaft Assembly Removal*

- Remove the right engine cover (see Right Engine Cover Removal).
- Remove the retainers on the right balancer shaft bearing.




A. Retainers B. Balancer Shaft Bearing

- While aligning the punch marks on the crankshaft balancer gear and the balancer shaft gear, pull out the balancer shaft assembly.




A. Punch Mark on the Crankshaft Balancer Gear
B. Punch Mark on the Balancer Shaft Gear

**NOTE**

- *Keep the punch marks aligned during removal for the balancer shaft bearing to clear the crankshaft balancer gear and for the weights to clear the crankshaft housing.*

*Balancer Shaft Assembly Installation Note*

○Installation is the reverse of removal. Note the following.

●Align the punch marks on the crankshaft balancer gear and the balancer shaft gear.

*Balancer Shaft Gear Removal*

●Remove the right engine cover (see Right Engine Cover Removal).

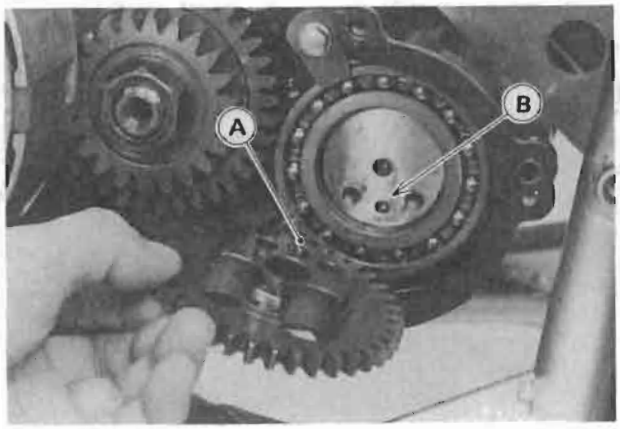
●Bend the lockwasher tabs up.

●Remove the mounting bolts and pull the balancer shaft gear off the balancer shaft.

*Balancer Shaft Gear Installation Notes*

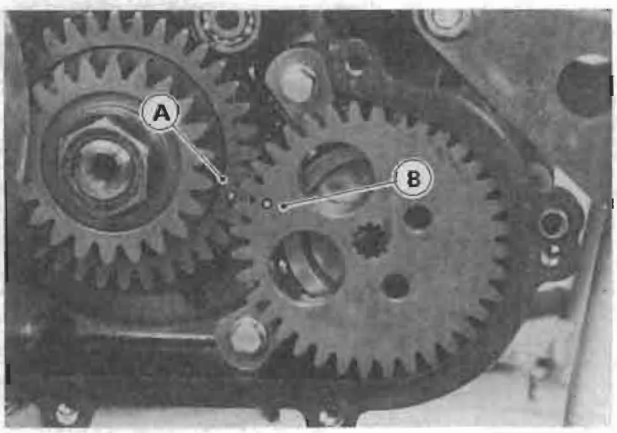
○Installation is the reverse of removal. Note the following.

●Fit the balancer shaft pin into the balancer shaft gear.




A. Pin B. Hole

●Install the balancer shaft gear aligning the punch mark on the gear with the punch mark on the crankshaft balancer gear.




A. Punch Mark on Crankshaft Gear
B. Punch Mark on Balancer Shaft Gear

●Tighten the mounting bolts on the balancer shaft gear to the specified torque (see Exploded View).

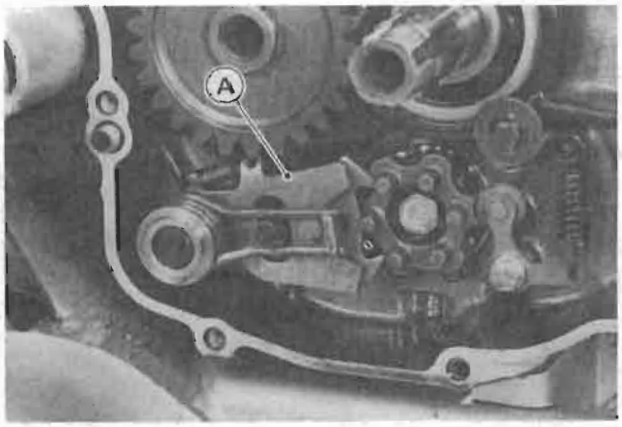
●Bend the lockwasher tabs over the bolts.

## External Shift Mechanism

*External Shift Mechanism Removal*

●Remove the following parts.
Clutch
Shift Pedal

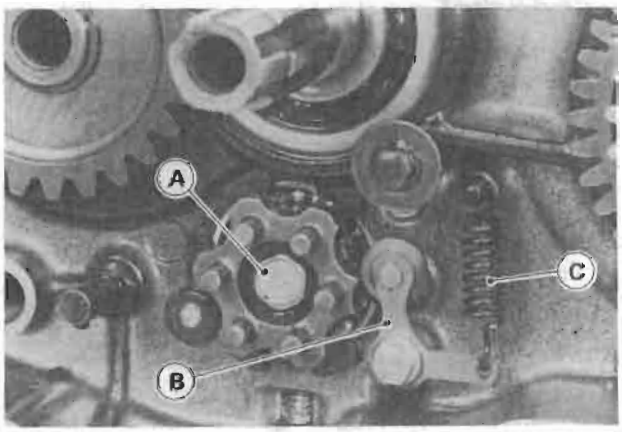
●Pull the external shift mechanism arm out of the crankcase.




A. External Shift Mechanism Arm

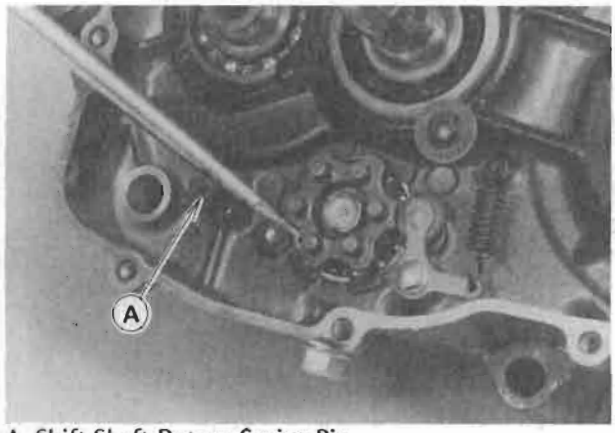
●Remove the shift drum position lever spring.

●Remove the bolt, and then remove the shift drum position lever and collar.




A. Bolt C. Position Lever Spring
B. Shift Drum Position Lever

•Hold the drum cam with a suitable tool and loosen the cam mounting bolt. This prevents distortion of the shift fork.




A. Shift Shaft Return Spring Pin

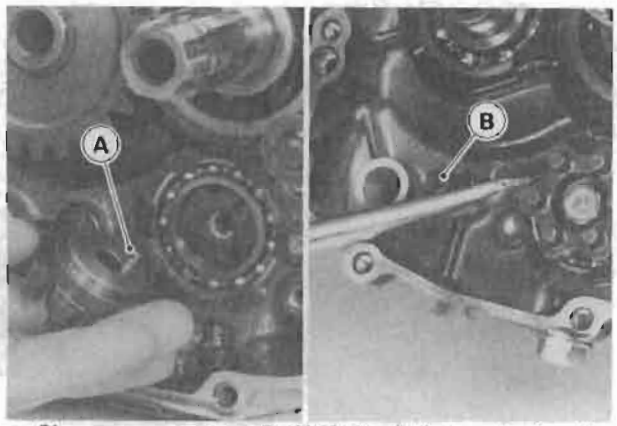
•Remove the shift drum cam and bolt.

### *External Shift Mechanism Installation Notes*

○Installation is the reverse of removal. Note the following.

•Fit the shift drum pin between the shift drum and drum cam.

•Hold the drum cam with a suitable tool and tighten the cam mounting bolt to the specified torque (see Exploded View). This prevents distortion of the shift fork.



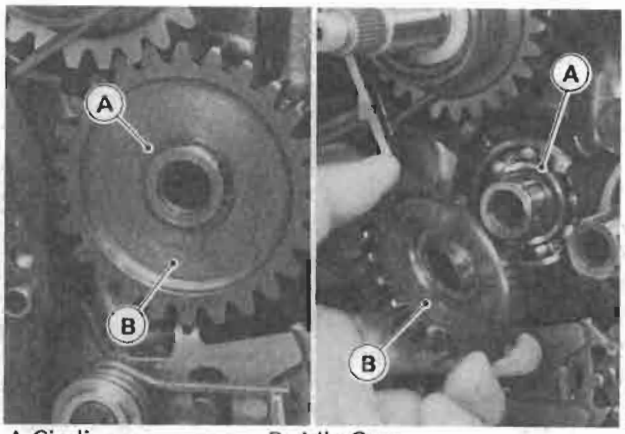

A. Pin B. Shift Shaft Return Spring Pin

•Apply non-parmanent locking agent to the threads of the return spring pin and tighten it to the specified torque (see Exploded View).

•While spinning the output shaft, shift the transmission through all gears to make certain there is no binding and that all gears shift properly.

•Apply molybdenum disulfide grease to the inside of the output shaft idle gear.

•Install the circlip, output shaft idle gear, and circlip. The side of the hub that protrudes the most faces in.

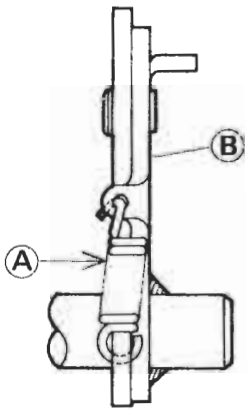



A.Circlips B. Idle Gear

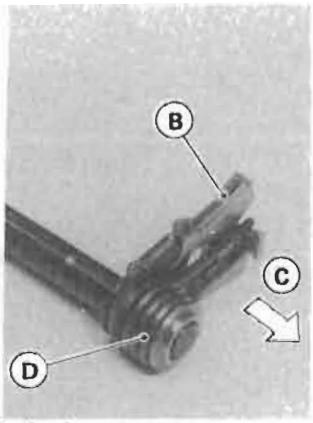
•Install the arm spring on the shift mechanism arm noting the proper direction of the hook.

○This prevents the spring from hitting the mechanism arm.

•Install the arm return spring with the spring arms inside.



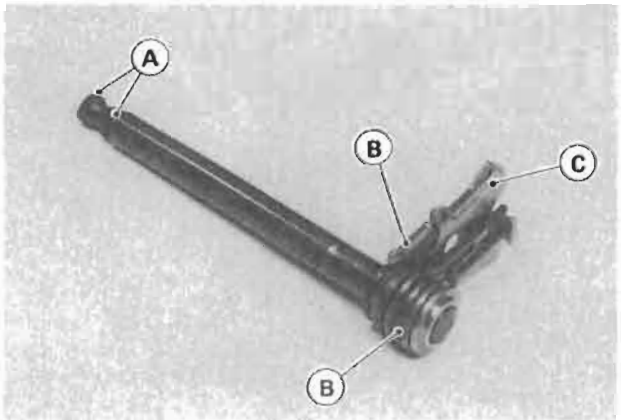

A. Arm Spring
B. Shift Mechanism Arm




C. Outboard
D. Arm Return Spring

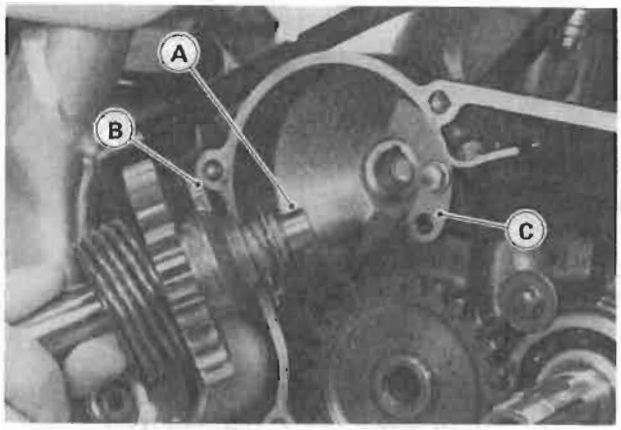
### *External Shift Mechanism Inspection*

•Examine the shift mechanism for any damage.




A. Splines
B. Springs
C. Arm

○Check the shift shaft for bending or damage to the spline.
☆If the shaft is bent, straighten or replace it. If the spline is damaged, replace the shaft.
○Check the springs for breaks or distortion.
☆If the springs are damaged in any way, replace them.
○Check the shift mechanism arm for distortion.
○If the shift mechanism arm is damaged in any way, replace the arm.
○Check that the return spring pin is not loose.
★If it is loose, unscrew it, apply non-permanent locking agent to the threads, and tighten it to the specified torque (see Exploded View)

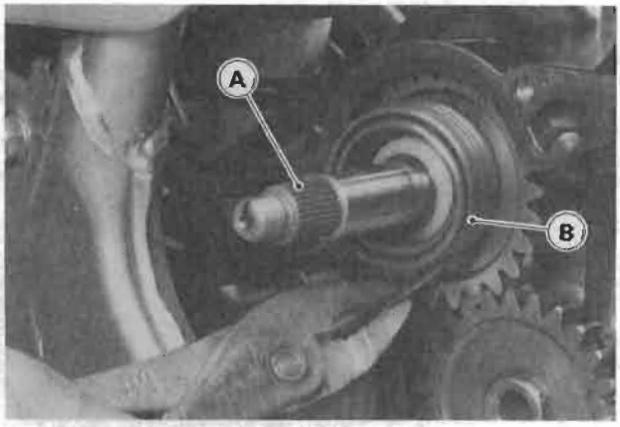



A. Kick Shaft Journal C. Kick Guide
B. Ratchet Arm

## Kickstarter

### *Kickstarter Removal*

●Remove the clutch (see Clutch Removal).
●Remove the return spring with pliers.




A. Kick Shaft Assembly B. Return Spring

●Remove the kick shaft assembly.

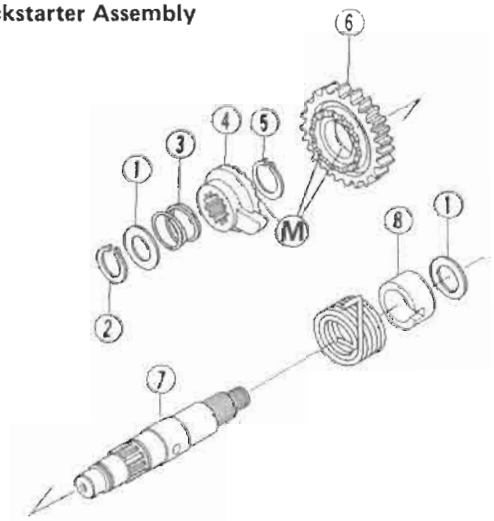
### *Kickstarter Installation Notes*

●Apply a thin coat of molybdenum disulfide grease to the kick shaft journal.
●Put the thrust washer on the kick shaft end, and fit the kick shaft assembly in the right crankcase.
○Fit the ratchet arm in the left side of the kick guide and install the kick shaft assembly.

### *Kickstarter Assembly Notes*

●Apply a thin coat of molybdenum disulfide grease to the ratchet teeth and the kick gear inside.

**Kickstarter Assembly**



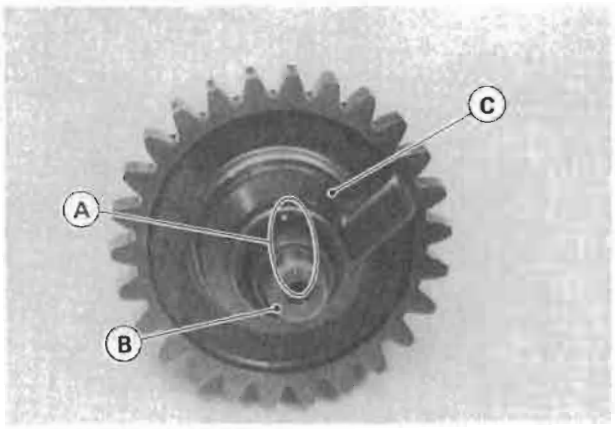

**M : Apply molybdenum disulfide grease.**

1. Washers
2. Circlip
3. Spring
4. Ratchet
5. Circlip
6. Kick Gear
7. Kick Shaft
8. Spring Guide

●Align the ratchet punch mark with the punch mark on the kick shaft.

**CAUTION**

**○Misalignment of the ratchet changes the kick spring preload. Light preload could cause mechanism noise and heavy preload could weaken or break the spring.**



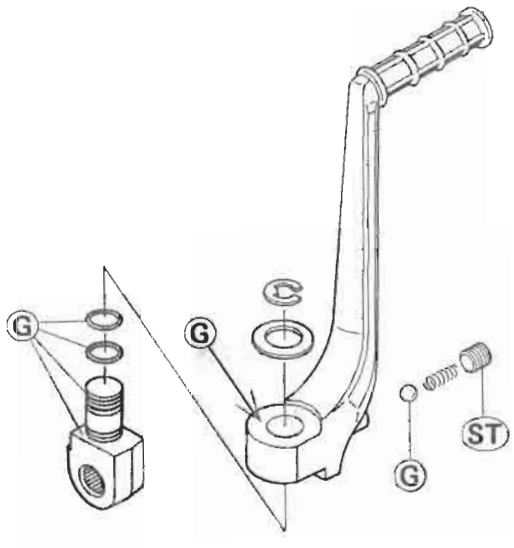

A. Align the marks.
B. Kick Shaft
C. Ratchet

•Push in the kick spring guide completely facing the slit inboard.
•Install the washer.

### *Kick Pedal Assembly Notes*

•Grease the kick pedal boss, O-rings and ball.
•Tighten the screw fully and stake it against the kick pedal.

**Kick Pedal Assembly**




**G : Grease here.**
**ST: Stake the screw.**

## Oil Seal, Ball and Needle Bearing

### *Oil Seal, Ball and Needle Bearing Wear*

•Check the ball bearings.
○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in high-flash point solvent, dry it (do not spin the bearing while it is dry), and oil it with transmission oil.

**WARNING**

○**Clean the bearings in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean them. A fire or explosion could result.**

○Spin the bearing by hand to check its condition.
★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.
•Check the needle bearing.
○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
★If there is any doubt as to the condition of a needle bearing, replace it.
•Check the oil seals for signs of damage.
★If necessary, replace them with new ones.

# Engine Left Side

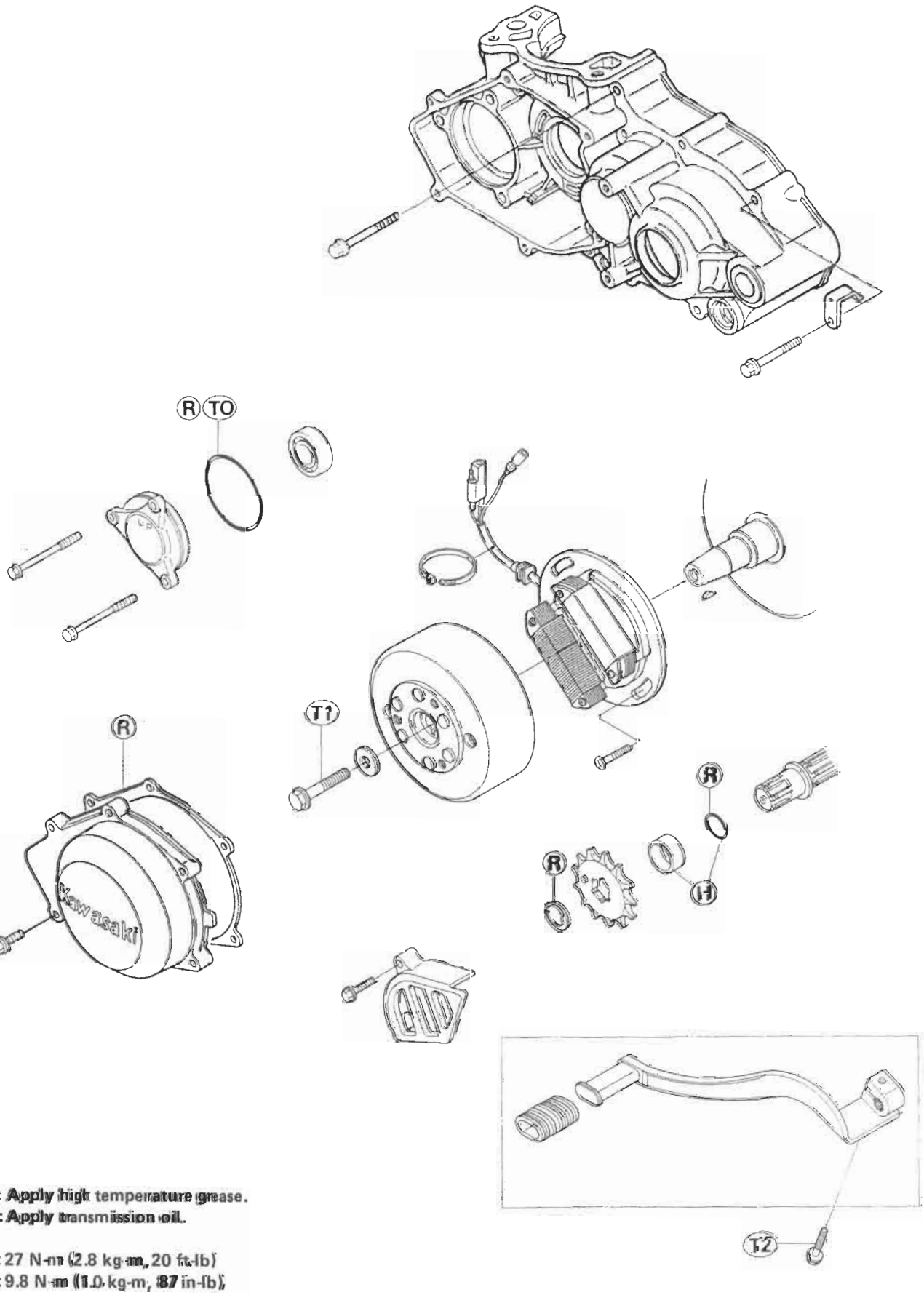
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## 6-2 ENGINE LEFT SIDE

### Exploded View




H : Apply high temperature grease.
TO : Apply transmission oil.

T1 : 27 N·m (2.8 kg-m, 20 ft-lb)
T2 : 9.8 N·m (1.0 kg-m, 87 in-lb)

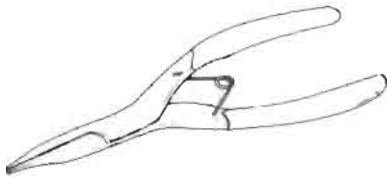
## Specification

**Engine Sprocket Teeth No.:**

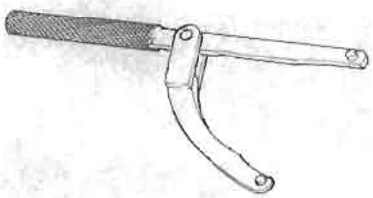
| | |
|---|---|
| Standard: | 13 |
| Option: | 14 |

## Special Tools

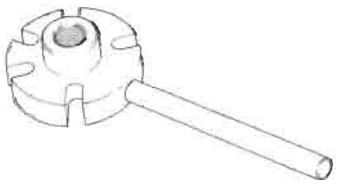
**Outside Circlip Pliers: 57001-144**



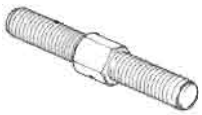
**Flywheel Holder: 57001-306**



**Magneto Puller: 57001-259**



**Rotor Puller: 57001-1099**



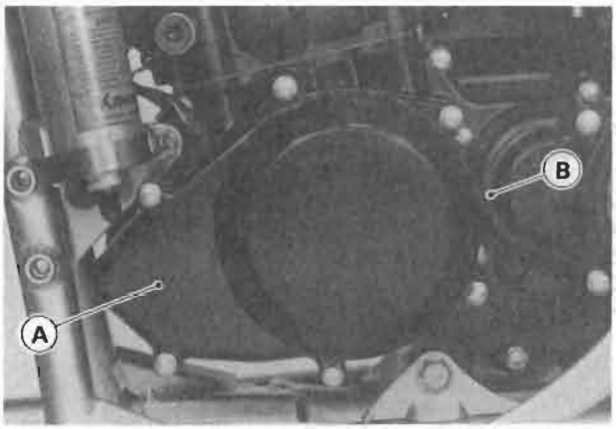
**Bearing Driver Set: 57001-1129**



## Magneto Flywheel

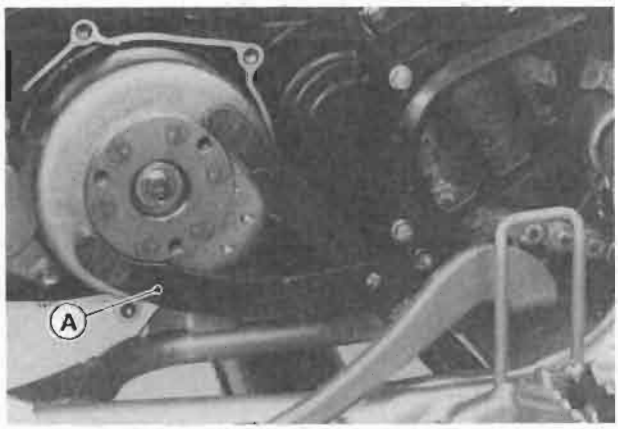
### *Magneto Flywheel Removal*

●Remove the magneto cover.



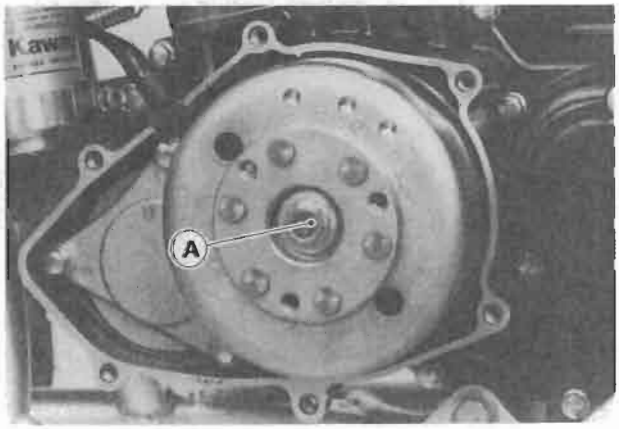

A. Magneto Cover B. Pry Point

●Using the flywheel holder (special tool) to hold the flywheel steady, loosen the flywheel bolt a few turns.




A. Flywheel Holder: 57001-306

○Do not take out the bolt and washer yet. They prevent flywheel hub damage when removing the flywheel with a rotor puller (special tool).

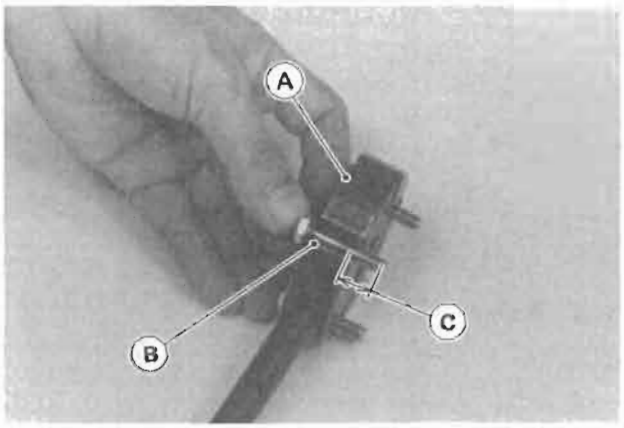



A. Bolt and Washer

●Install the magneto puller (special tool) using three suitable bolts (M6 x P1.0 x about 30 mm long) and washers on the magneto flywheel.

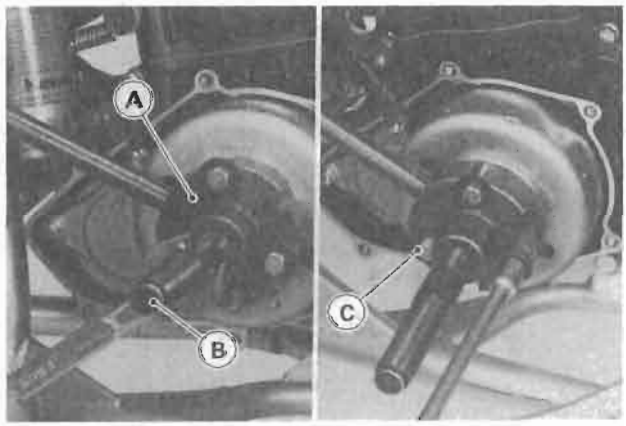
**NOTE**

○*With the suitable bolts and washers installed on the puller, the bolt ends must project about 10 – 12 mm.*




A. Magneto Puller: 57001-259
B. Suitable Bolts and Washers
C. 10 – 12 mm

●Screw in the rotor puller (special tool) until it stops, then tighten the three suitable bolts evenly. The magneto flywheel will be removed.



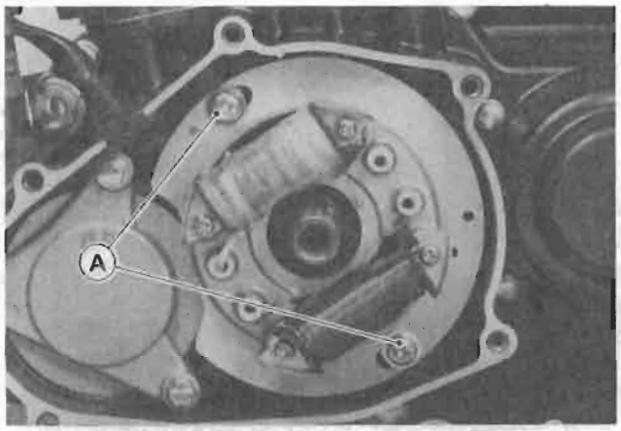

A. Magneto Puller: 57001-259
B. Rotor Puller: 57001-1099
C. Three Bolts

**CAUTION**

**○Do not strike the magneto flywheel itself. Striking the flywheel can cause the magnets to lose their magnetism.**

●Remove the bolt and flat washer.
●Take out the magneto flywheel.

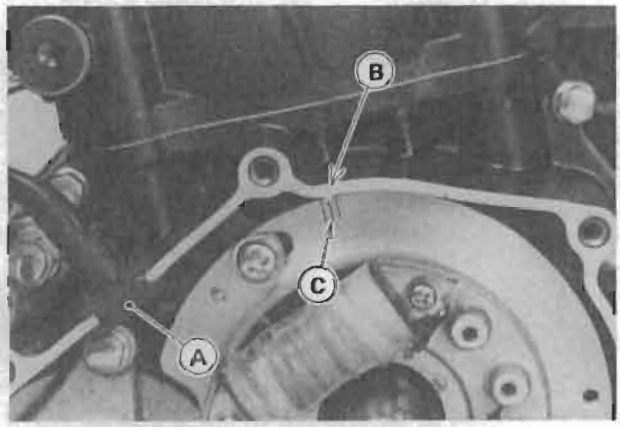
- Disconnect the wiring connectors from the magneto.
- Unscrew the mounting screws and pull the stator out of the crankcase.




A. Magneto Stator Mounting Screws

### *Magneto Flywheel Installation*

- Install the magneto stator so that the center mark on the magneto stator aligns with the mark on the crankcase. Fit the rubber fitting into the crankcase.




A. Rubber Fitting
B. Crankcase Mark
C. Center Mark

- Clean the crankshaft tapers and the magneto flywheel hub with an oil-less cleaning fluid such as trichloroethylene or acetone.

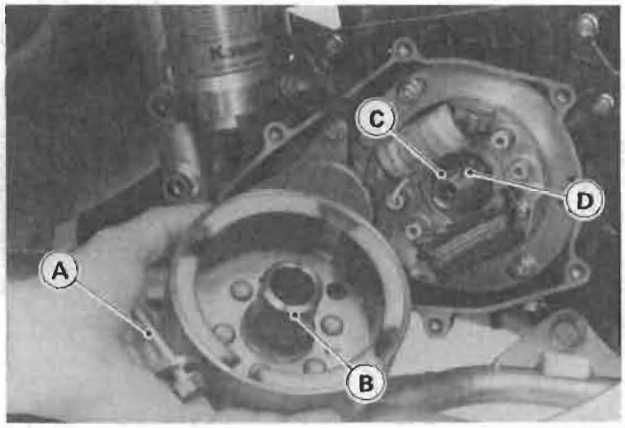
**WARNING**

**○These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.**

**CAUTION**

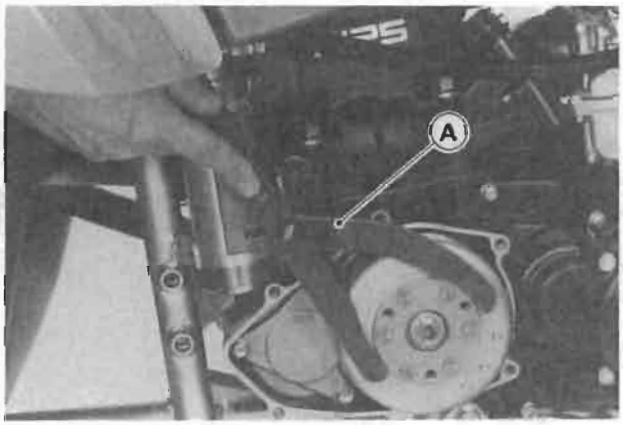
**○Oil, dirt, or incorrect tightening may cause flywheel bolt loosening and serious damage.**

- Fit the flywheel onto the crankshaft so that the woodruff key fits in the groove in the hub of the flywheel.
- Insert the bolt with the flat washer.




A. Bolt and Washer
B. Flywheel Hub
C. Crankshaft Tapers
D. Woodruff Key

- Using the flywheel holder (special tool) as shown to keep the crankshaft steady, tighten the flywheel bolt to the specified torque (see Exploded View).

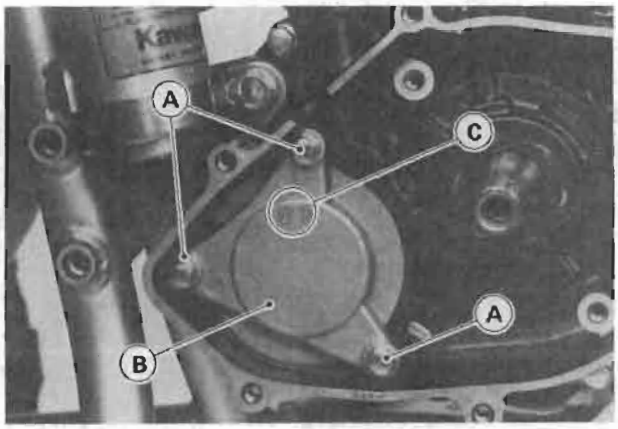



A. Flywheel Holder: 57001-306

## Balancer Bearing Housing

### *Balancer Bearing Housing Removal*

- Drain the transmission oil (see Oil Changing in the Engine Right Side chapter).
- Remove the following parts.
  Magneto Flywheel and Stator
  Balancer Bearing Housing Mounting Bolts
  Balancer Shaft Assembly (see Balancer Shaft Assembly Removal in the Engine Right Side chapter)
- Tap out the balancer bearing housing from the engine right side.




A. Mounting Bolts C. UP Mark
B. Bearing Housing

### *Balancer Bearing Housing Installation Notes*

- Check the O-ring in the housing and replace it if damaged.
- Apply oil to the O-ring and install the housing so that the UP mark faces upward.
- Wipe up any oil that spills.

### *Balancer Bearing Removal/Installation*

Refer to Oil Seal and Bearing Removal in the Crankshaft/Transmission chapter.

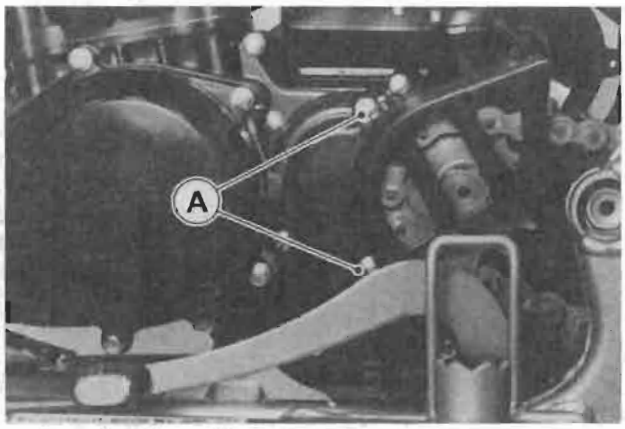
### *Balancer Bearing Wear Inspection*

Refer to Ball Bearing Wear Insepction in the Crankshaft/Transmission chapter.

## Engine Sprocket

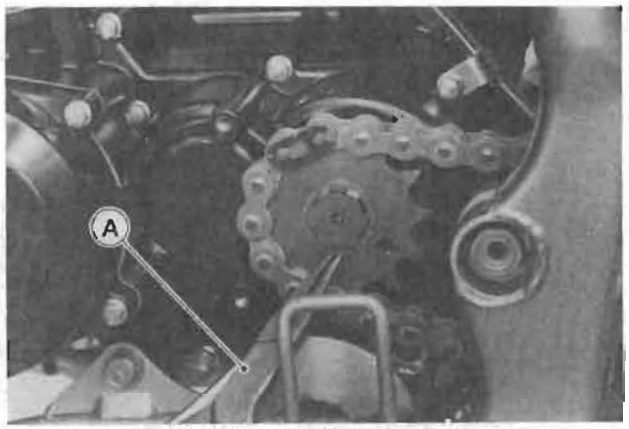
### *Engine Sprocket Removal*

- Remove the engine sprocket cover by taking out the bolts shown.



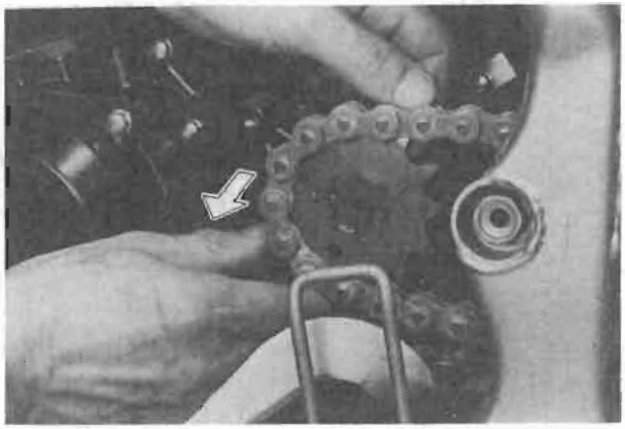

A. Sprocket Cover Mounting Bolts

- Turn the bearing housing so that the chain is loose (see Chain Slack Adjustment in the Final Drive chapter).
- Remove the circlip with circlip pliers (special tool).




A. Outside Circlip Pliers: 57001-144

- Slide off the engine sprocket and separate it from the drive chain.



### *Engine Sprocket Installation Notes*

○The installation is the reverse of removal. Note the following.

●Either side of the sprocket may face outboard.

●Install the new circlip.

### *Engine Sprocket Wear*

●Visually inspect engine sprocket teeth.

★If teeth are worn as illustrated, replace the sprocket, and inspect the drive chain and rear sprocket (see Drive Chain Wear Inspection in the Final Drive chapter).

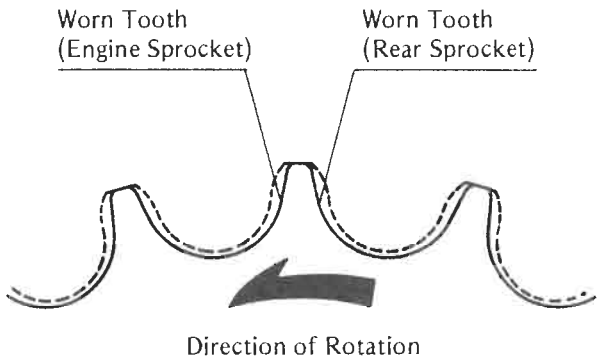
**CAUTION**

○**If a sprocket requires replacement, the drive chain is probably worn also. Upon replacing the engine sprocket, inspect the chain and rear sprocket.**

**NOTE**

○*Sprocket wear is exaggerated for illustration.*

**Sprocket Teeth**




Direction of Rotation

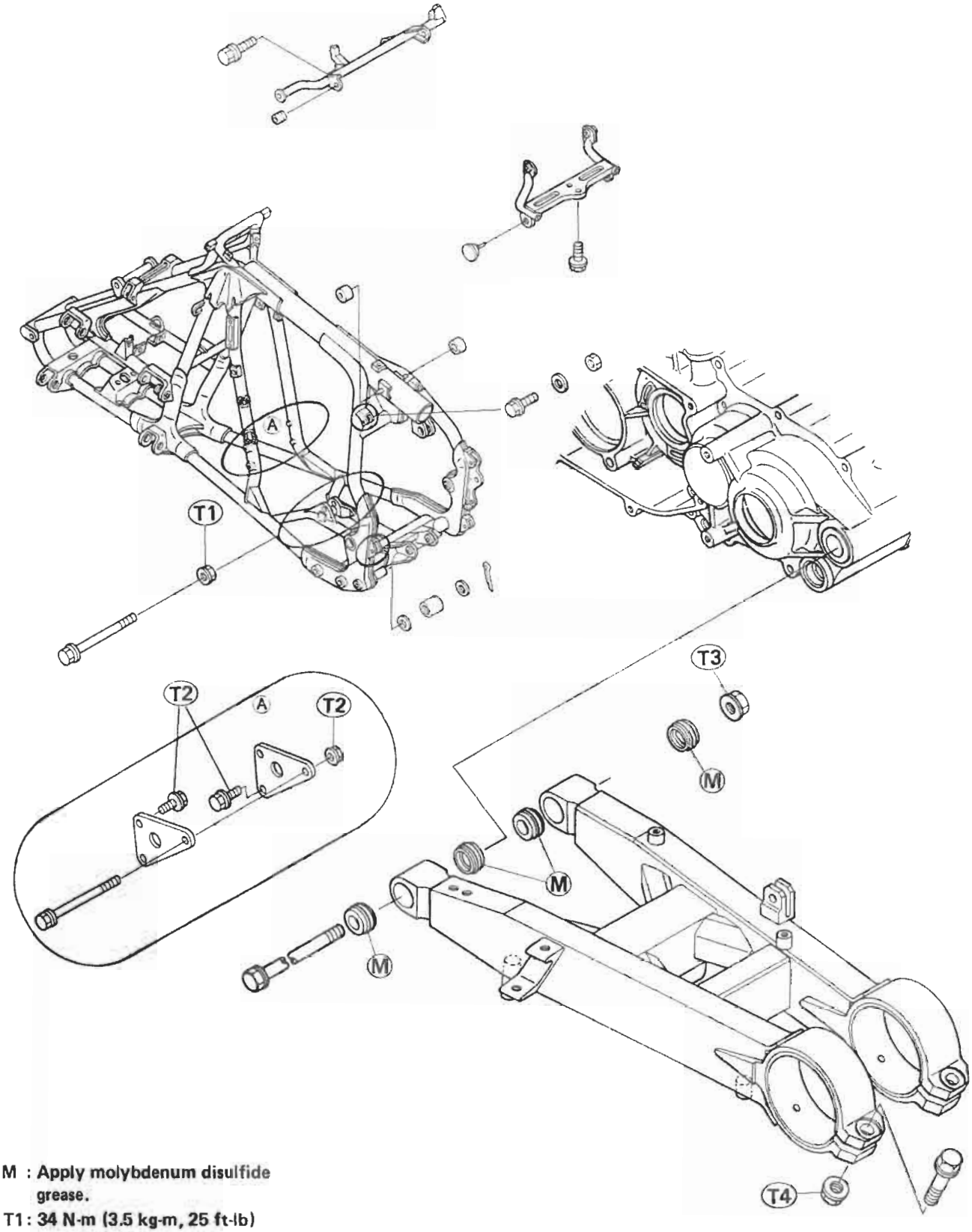
# Engine Removal/Installation

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## 7-2 ENGINE REMOVAL/INSTALLATION

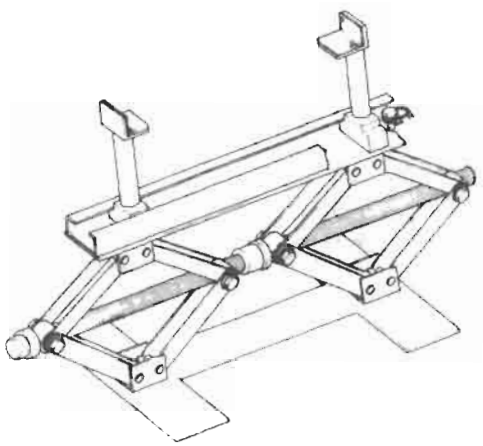
### Exploded View




M : Apply molybdenum disulfide grease.
T1 : 34 N-m (3.5 kg-m, 25 ft-lb)
T2 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
T3 : 78 N-m (8.0 kg-m, 58 ft-lb)
T4 : 64 N-m (6.5 kg-m, 47 ft-lb)

## Special Tool

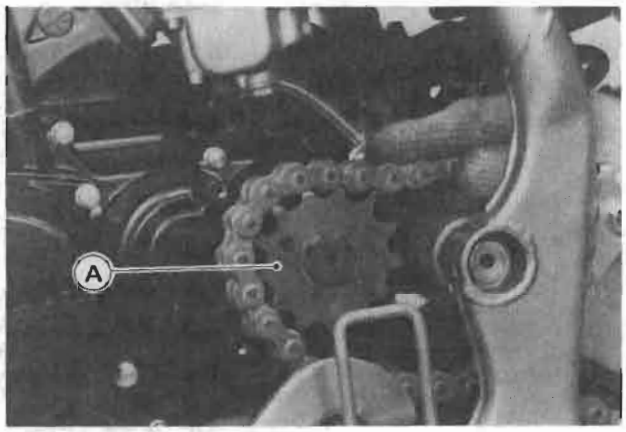
**Jack: 57001-1238**



## Engine Removal/Installation

### *Engine Removal*

- For later installation convenience, note and record how and where cables, wiring, and hoses are routed. They should not be bent sharply, kinked, or twisted.
- Drain the coolant (see Coolant Changing in the Cooling System). To avoid burns, wait until the engine cools down.
- Drain the transmission oil (see Oil Changing in the Engine Right Side chapter).
- Remove the following parts.
  - Right-Hand Footpeg
  - Brake Pedal (see Right Engine Cover Removal in the Engine Right Side chapter)
  - Fuel Tank (see Fuel System chapter)
  - Front Fender Stay
  - Radiator (see Cooling System chapter)
  - Mufflers (see Engine Top End chapter)
  - Shift Pedal
  - Carburetor (see Fuel System chapter)
- Free the following cable ends.
  - Clutch Cable Lower End
  - Parking Brake Cable Upper End
- If the crankcases are to be split, the following parts may be removed with the engine in the frame.
  - Engine Right Side Parts (see Engine Right Side chapter)
  - Engine Left Side Parts (see Engine Left Side chapter)
- After removing the parts above, temporarily install the following parts.
  - Magneto Cover
  - Right Engine Cover and Water Pump Cover
- Disconnect the wires from the engine components, and free them from the clamps.
  - Magneto Stator Connectors
  - Spark Plug Cap and Plug
- Remove the drive chain from the engine sprocket as follows.
- Turn the bearing housing so that the chain is loose.
- Remove the engine sprocket cover.
- Lift the drive chain off the engine sprocket.




A. Engine Sprocket

- Support the rear part of the frame on blocks or a jack (eg. special tool: PN 57001-1238).
- Remove the swing arm from the engine as follows.

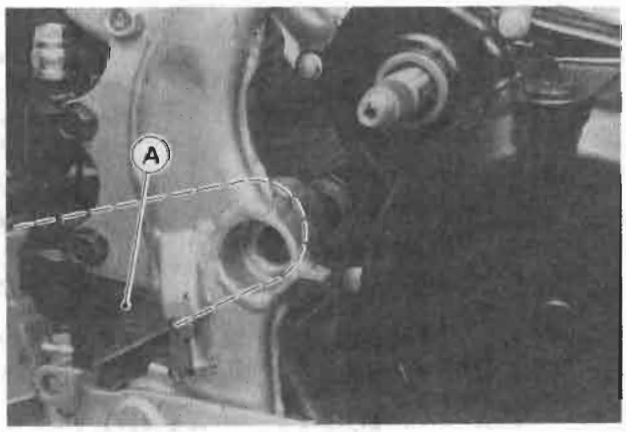
**WARNING**

- **The swing arm shaft also serves as the engine mounting bolt. Take precautions to insure the frame is well supported, and that the vehicle will not fall over when the swing arm shaft is removed.**

- Support the swing arm on blocks or a jack stand.
- Pull out the swing arm shaft by removing the nut.
- Just move the swing arm rearward.

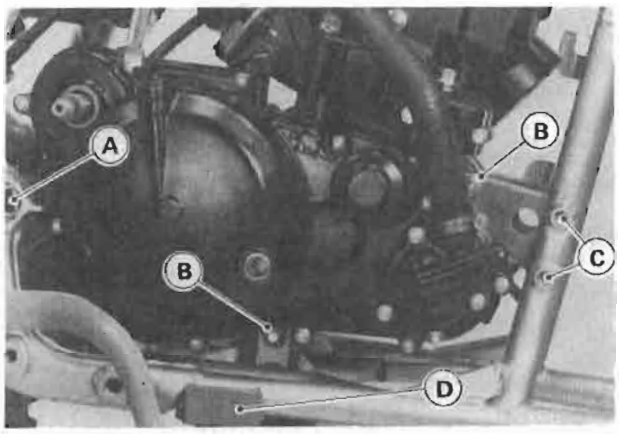
**NOTE**

- *It is not necessary to remove the rear shock, rear wheels, brake hose, brake cable and Uni-Trak tie-rod for moving the swing arm.*




A. Swing Arm

- Remove the rear shock reservoir.
- Remove the engine mounting bracket bolts and engine mounting bolts and nuts.



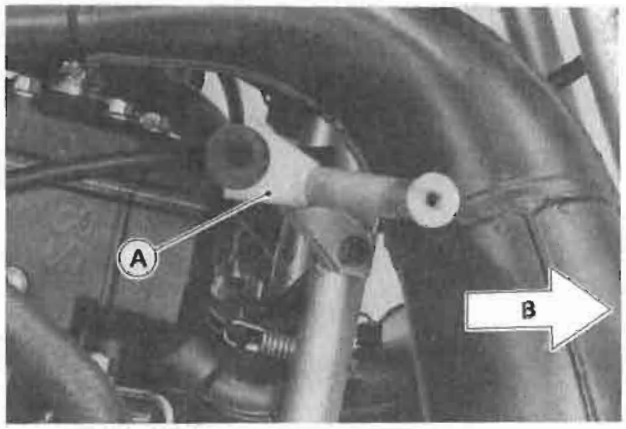

A. Swing Arm Shaft
B. Engine Mounting Bolts and Nuts
C. Bracket Bolts
D. Blocks or Jack

- Move the cables, hoses, and wires out of the way.
- Remove the engine from vehicle's right side.



### *Engine Installation Notes*

- Engine installation is the reverse of removal. Note the following.
- Temporarily install the engine mounting nuts and bolts, and then, install the swing arm shaft.
- Tighten the engine mounting nuts, swing arm shaft nut, and bracket bolts to the specified torque (see Exploded View).
- Be sure to install the front fender stay as shown. Do not install it backward or upside down.




A. Front Fender Stay B. Front

- Run the following cables, and hoses according to the cable and Harness Routing section in the General Information chapter).
  - Throttle Cable
  - Clutch Cable
  - Parking Brake Cable
  - Carburetor Hoses
  - Crankcase Breather Hose
  - Reservoir Tank Hoses
  - Wires
- Adjust the following parts (see each appropriate chapter).
  - Throttle Cable
  - Clutch Cable
  - Parking Brake Cable
- Fill the engine with transmission oil (see Engine Right Side chapter).
- Fill the engine with coolant and bleed the air from the cooling system (see Cooling System chapter).
- Adjust the carburetor idle screw.

# Crankshaft/Transmission

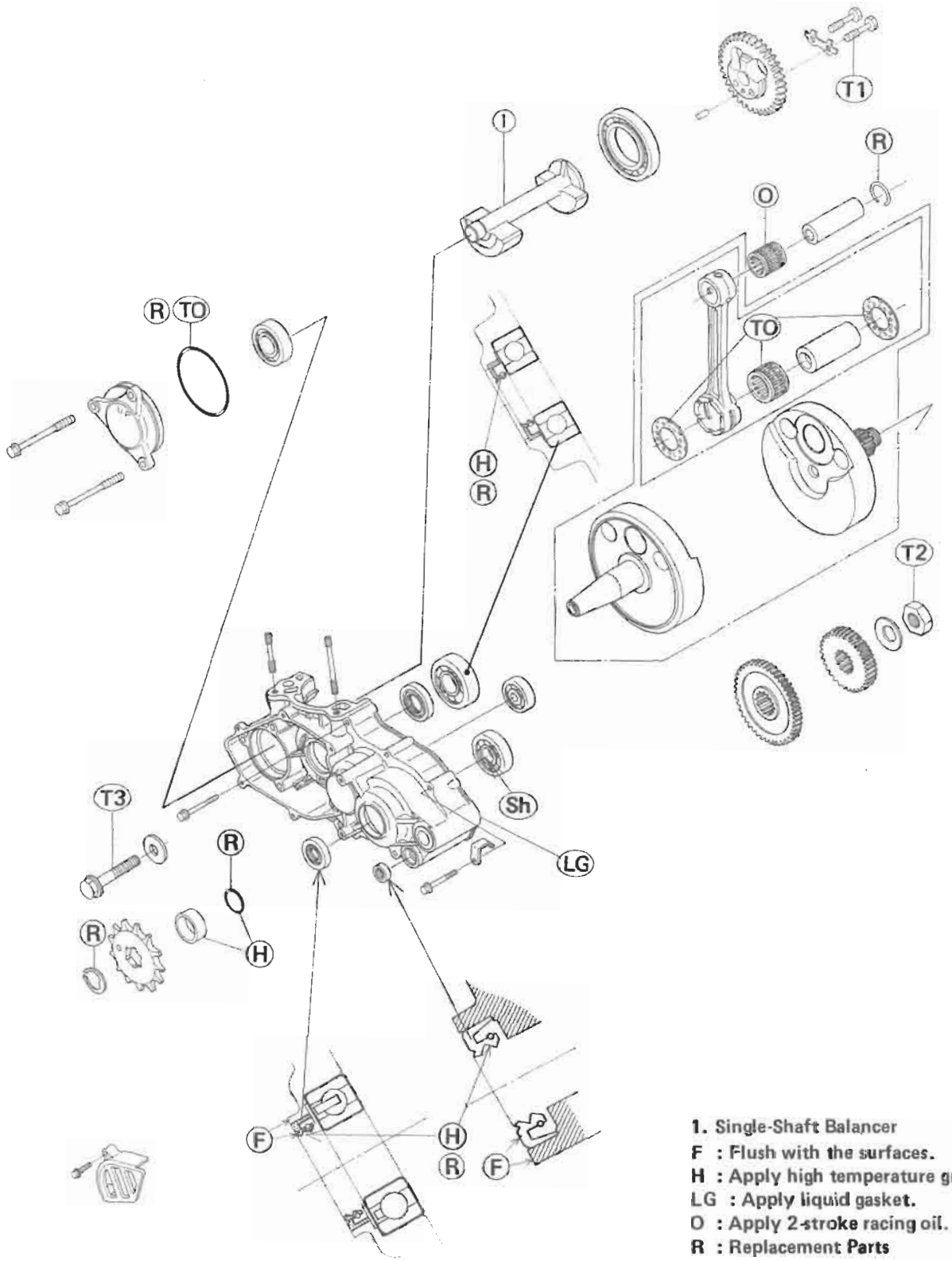
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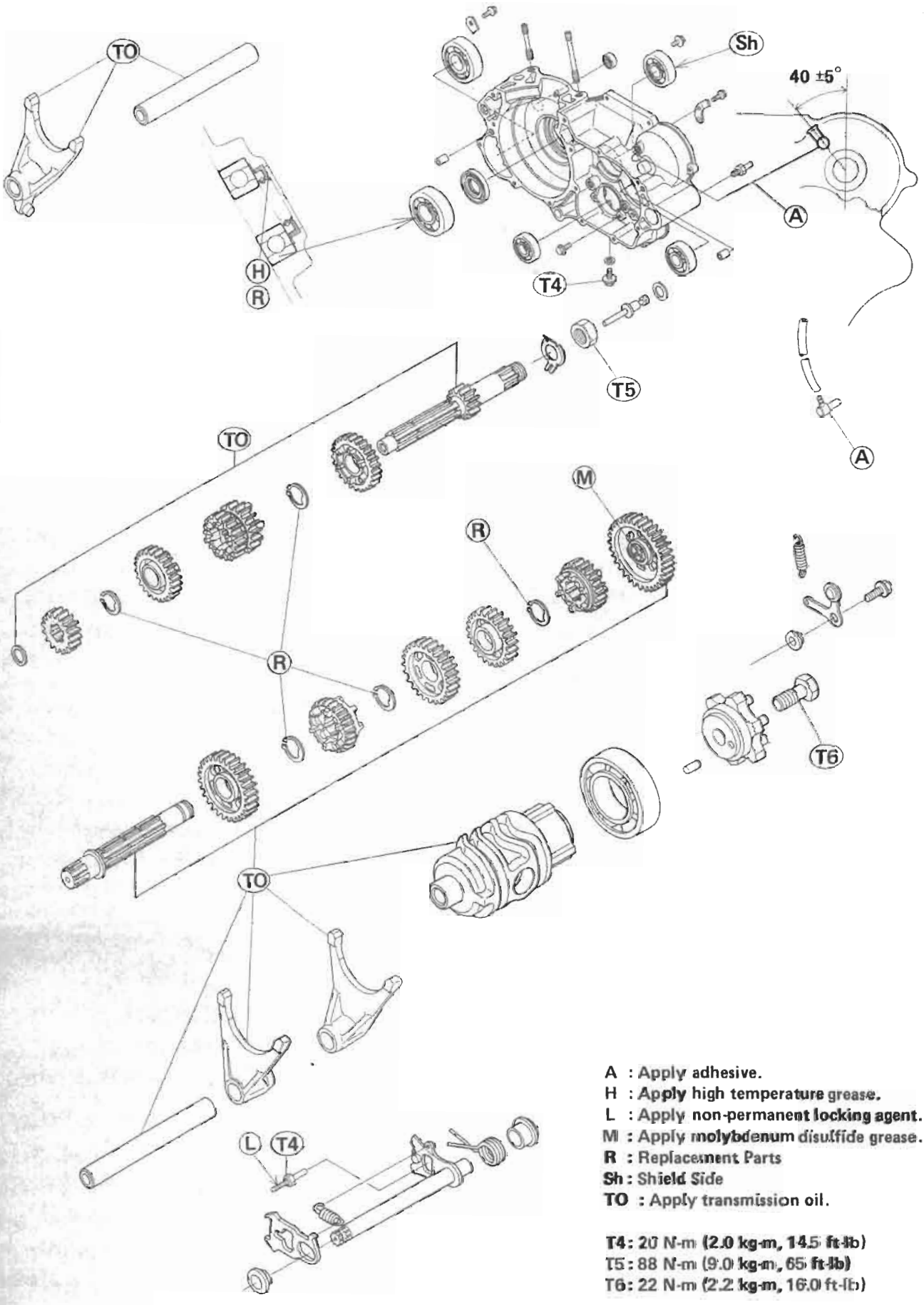
## Exploded View




1. Single-Shaft Balancer
F : Flush with the surfaces.
H : Apply high temperature grease.
LG : Apply liquid gasket.
O : Apply 2-stroke racing oil.
R : Replacement Parts

TO : Apply transmission oil.

T1 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T2 : 78 N-m (8.0 kg-m, 58 ft-lb)
T3 : 27 N-m (2.8 kg-m, 20 ft-lb)




A : Apply adhesive.
H : Apply high temperature grease.
L : Apply non-permanent locking agent.
M : Apply molybdenum disulfide grease.
R : Replacement Parts
Sh : Shield Side
TO : Apply transmission oil.

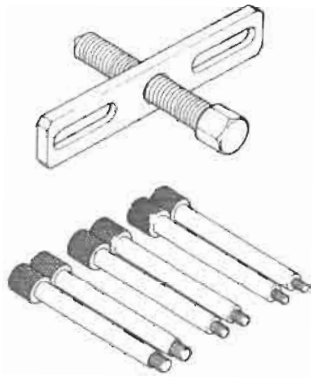
T4: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T5: 88 N-m (9.0 kg-m, 65 ft-lb)
T6: 22 N-m (2.2 kg-m, 16.0 ft-lb)

## Specifications

| Item | Standard | Service Limit |
|---|---|---|
| **Crankshaft, Connecting Rod:** | | |
| Connecting rod big end radial clearance | 0.037 – 0.049 mm | 0.100 mm |
| Connecting rod big end side clearance | 0.45 – 0.55 mm | 0.80 mm |
| Crankshaft runout | 0.03 mm TIR or under | 0.08 mm TIR |
| Cold-fitting tolerance between crankpin and crankwebs | 0.110 – 0.129 mm | – – – |
| **Transmission:** | | |
| Shift fork ear thickness | 4.4 – 4.5 mm | 4.3 mm |
| Gear shift fork groove width | 4.55 – 4.65 mm | 4.80 mm |
| Shift fork guide pin diameter | 5.9 – 6.0 mm | 5.8 mm |
| Shift drum groove width | 6.05 – 6.20 mm | 6.30 mm |

## Special Tools

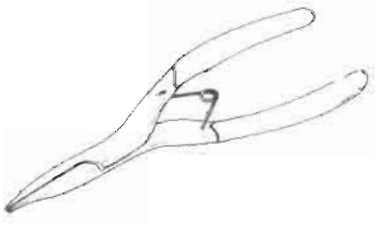
**Crankcase Splitting Tool Assembly: 57001-1098**



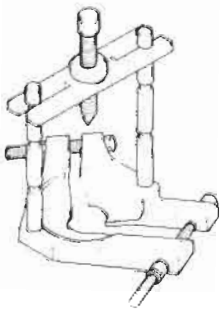
**Kawasaki Bond (Liquid Gasket-Silver): 92104-002**




**Outside Circlip Pliers: 57001-144**



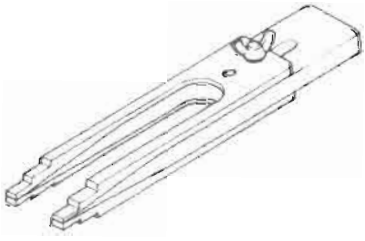
**Bearing Puller: 57001-158**



**Bearing Driver Set: 57001-1129**



**Crankshaft Jig: 57001-1174**



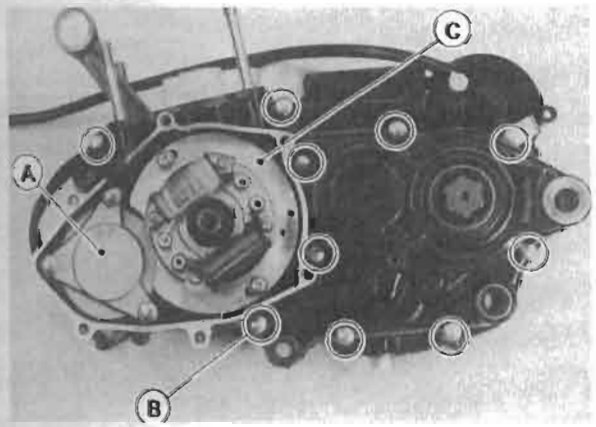
## Balancer Shaft

Refer to the Engine Right Side chapter for Balancer Information.

## Crankcase

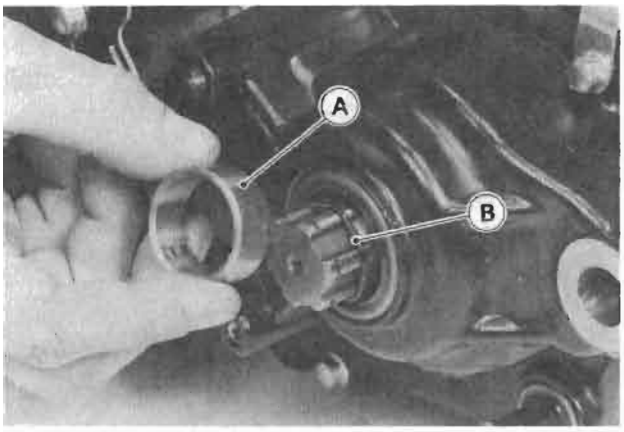
### *Crankcase Splitting*

- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface, or preferably, onto a suitable block to hold the engine steady while parts are being removed.
- *If the following parts were not removed during engine removal, remove them from the engine.
  - Engine Right Side Parts (see Engine Right Side chapter).
  - Engine Left Side Parts (see Engine Left Side chapter)
- Remove the engine top end parts (see Engine Top End chapter).
- Remove the gaskets and the dowel pins on the crankcase.
- Remove the ten left crankcase bolts, the magneto stator, and the balancer bearing retainer.



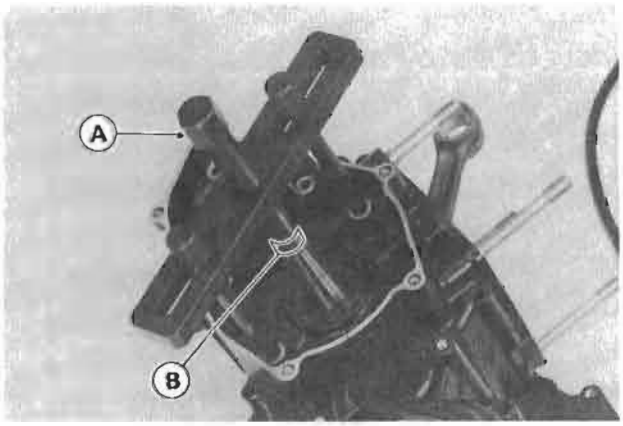

A. Balancer Bearing Retainer C. Magneto Stator
B. Bolts

- Be sure to remove the output shaft collar and O-ring using a hook.



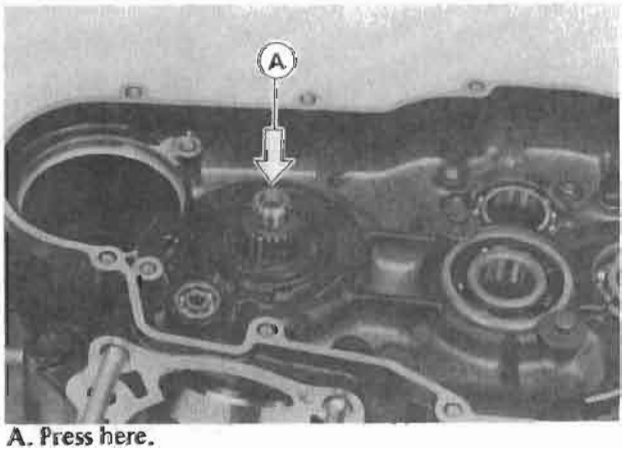

A. Collar B. O-Ring

- Install the crankcase splitting tool assembly (special tool) into the left side of the crankcase. Be certain to install a suitable adapter (e.g. nut) on the crankshaft end and screw the tool in all the way.
- Tighten the center bolt on the crankcase splitting tool to split the crankcase halves.




A. Crankcase Splitting Tool Assembly: 57001-1098
B. Suitable Adapter

- Lift off the left crankcase.
- Using a press, remove the crankshaft from the right crankcase.




A. Press here.

*Crankcase Assembly Notes*

○Assembly is the reverse of crankcase splitting. Note the following.

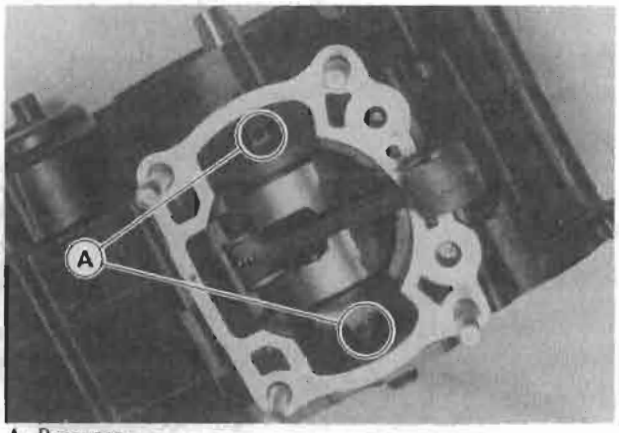
**NOTE**

○*Right and left crankcase halves are machined at the factory in the assembled state, so they must be replaced together as a set.*

**WARNING**

○**Clean the engine parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

●Blow through all oil passages with compressed air to clean any blockage.

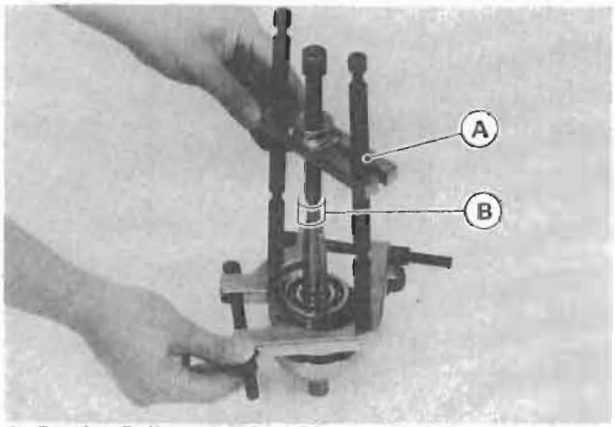



A. Passages

●If the breather pipe was removed, apply adhesive to the pipe and fit it in the right-hand crankcase in the proper direction (see Exploded View).

★If the bearings stay on the crankshaft when splitting the crankcase or removing the crankshaft from the right crankcase, remove the bearings from the crankshaft with a bearing puller (special tool).

○Discard the bearing that is removed from the crankshaft.



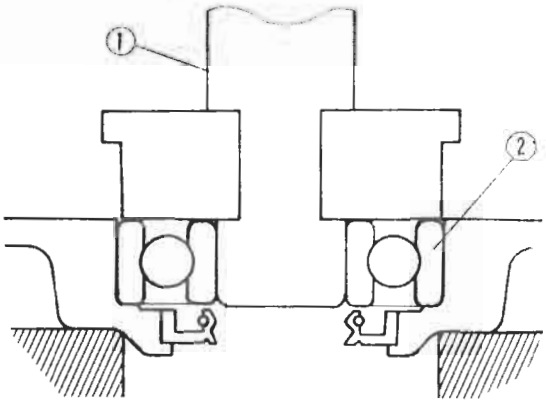

A. Bearing Puller: 57001-158 B. Adapter

●Position the right crankcase half so that the main bearing housing is seated on a suitable press fixture.

●Apply 2-stroke oil to the outer sides of the new crankshaft bearings.

●Press each crankshaft bearing until it bottoms out using a bearing driver from the driver set (special tool) which contacts the bearing outer race.

**Crankshaft Bearing Installation**

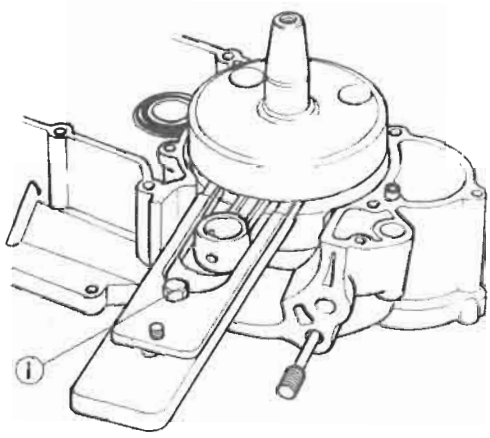



1. Bearing Driver Set: 57001-1129
2. Crankshaft Bearing

●Insert the crankshaft jig (special tool) between the crankshaft flywheels opposite the connecting rod big end to protect flywheel alignment as shown, and press the crankshaft into the right crankcase.

○The special tool is easily adjustable to fit in any gap between the flywheels and can prevent the gap change.

○When pressing, position the jig in the crankcase opening so the jig will not hit the crankcase.



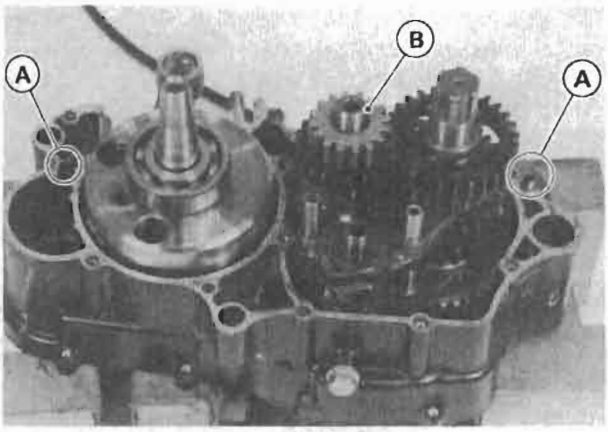

1. Crankshaft Jig: 57001-1174

●Apply small amount of transmission oil to the transmission gears, bearings, and shift drum.

●Install the transmission gears and shafts in the right crankcase.

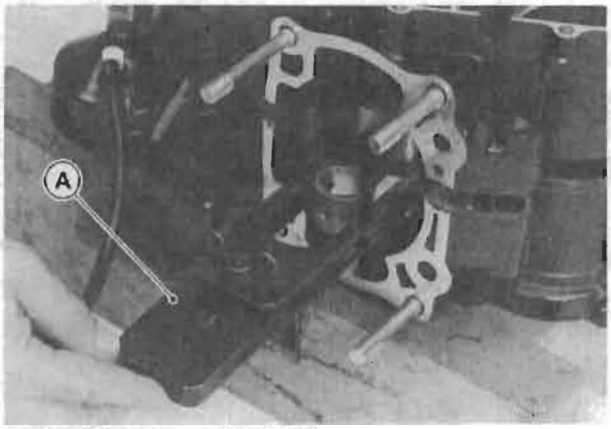
●Be sure the mating surfaces of the crankcase halves are clean and dry.

●Be sure the crankcase dowel pins and drive shaft washer are in position.




A. Dowel Pins B. Washer

- Apply liquid gasket to the mating surface of the left crankcase half.
- Install the left crankcase using a press.

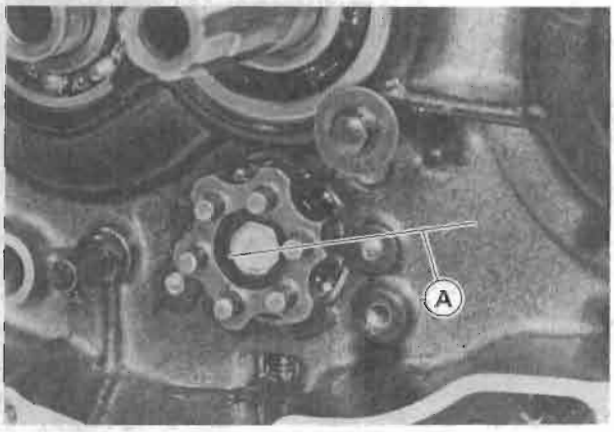



A. Crankshaft Jig: 57001-1174

NOTE

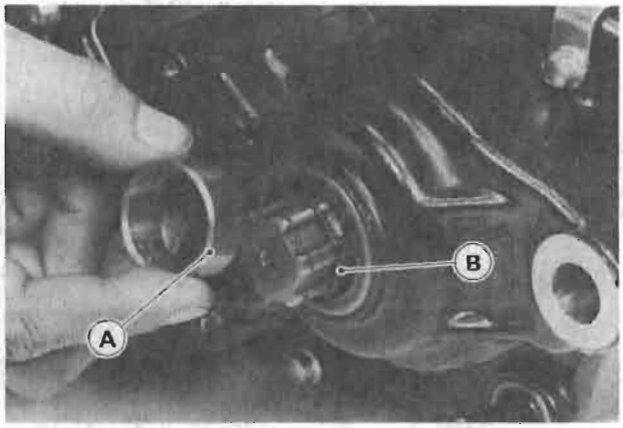
○*Constantly check the alignment of the two halves, and the position of the shafts.*

- Tighten the crankcase bolts securely.
- Turn the shift drum to the neutral position.




A. Neutral Position

- Check the following items.
○The crankshaft must turn freely.
○The drive shaft and output shaft must turn freely.
☆If the crankshaft will not turn, it probably is not centered. Tap the appropriate end of the crankshaft with a mallet to reposition it. If it does not free up, the crankcase will have to be disassembled to locate and correct the problem.
○While spinning the output shaft, shift the transmission smoothly from the 1st to 6th gear, and 6th to 1st.
- Apply a thin coat of high temperature grease to the output shaft O-ring and install it on the output shaft.
- Apply high temperature grease to the oil seal lips and slide the O-ring and the output shaft collar into position.
○Either side of the collar may face outboard.




A. Collar
B. O-Ring

## *Crankshaft Disassembly*

NOTE

○*Since assembly of the crankshaft demands exacting tolerances, the disassembly and reassembly of the crankshaft should only be performed by experienced mechanics with the necessary tools and equipment.*

- Remove the bearing from the crankshaft using the bearing puller (special tool: PN 57001-158).
- Press the crankpin out of the crank halves to separate the crank halves, connecting rod, crankpin needle bearing, and crankpin.

## *Crankshaft Assembly*

- Check that the connecting rod radial clearance is within specification .(see Connecting Rod Big End Radial Clearance).
- Press the crank halves onto the crankpin until the connecting rod side clearance is within specification (see Connecting Rod Big End Side Clearance).
- Adjust crankshaft runout until it is within specification (see Crankshaft Runout).

### *Connecting Rod Big End Seizure*

★In case of serious seizure with flywheels, the crankshaft must be replaced.

★In case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing side washers, and connecting rod.

### *Connecting Rod Big End Radial Clearance*

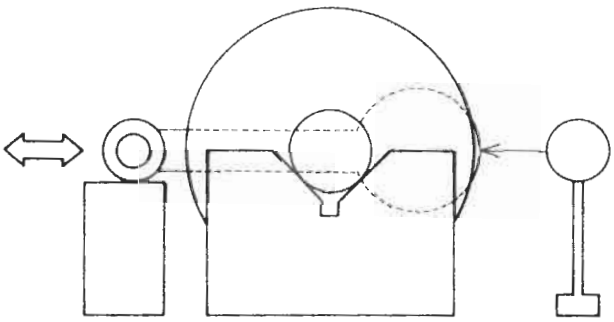
●Set the crankshaft on V blocks, and place a dial gauge against the big end of the connecting rod.

●Push the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.

★If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end visually inspected for wear.

**Connecting Rod Big End Radial Clearance**

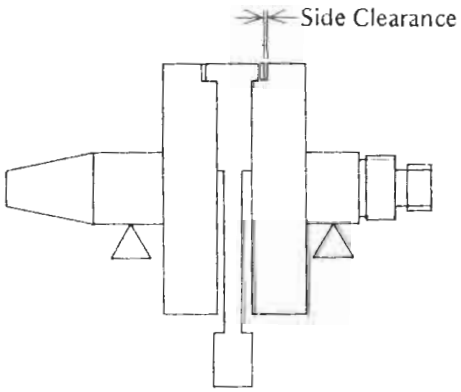
| | |
|---|---|
| **Standard:** | **0.037 – 0.049 mm** |
| **Service Limit:** | **0.100 mm** |



### *Connecting Rod Big End Side Clearance*

●Measure the side clearance of the connecting rod with a thickness gauge

**Connecting Rod Big End Side Clearance**




★If big end side clearance exceeds the service limit, the crankshaft assembly must be replaced or disassembled and the connecting rod and thrust washers visually inspected for wear.

**Connecting Rod Big End Side Clearance**

| | |
|---|---|
| **Standard:** | **0.45 – 0.55 mm** |
| **Service Limit:** | **0.80 mm** |

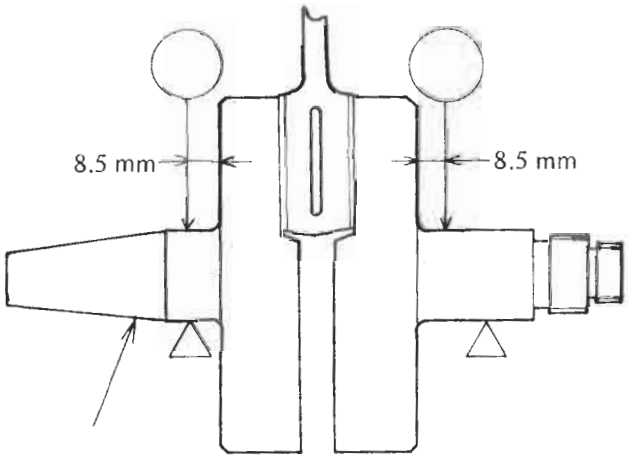
### *Crankshaft Runout*

●Set the crankshaft on V blocks, and place a dial gauge against the points indicated.

●Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.

**Crankshaft Runout**

| | |
|---|---|
| **Standard:** | **0.03 mm TIR or under** |
| **Service Limit:** | **0.08 mm TIR** |




Turn the crankshaft slowly.

★If runout at either location exceeds the service limit, align the crankshaft so that runout is within the service limit.

### *Crankshaft Alignment*

★If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit.

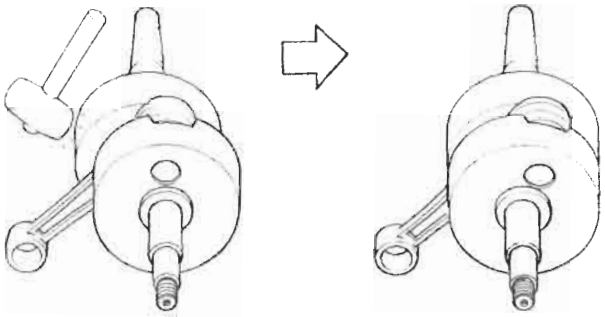
●In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead, or brass hammer as indicated in the figure.

●Recheck the runout with a dial gauge, repeating the process until the runout falls within the service limit.

○Vertical misalignment is corrected either by driving a wedge in between the flywheels or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment. In both cases of horizontal vertical misalignment, correct the horizontal misalignment first.

★If flywheel misalignment cannot be corrected by the above method, replace the crankpin or the crankshaft itself.

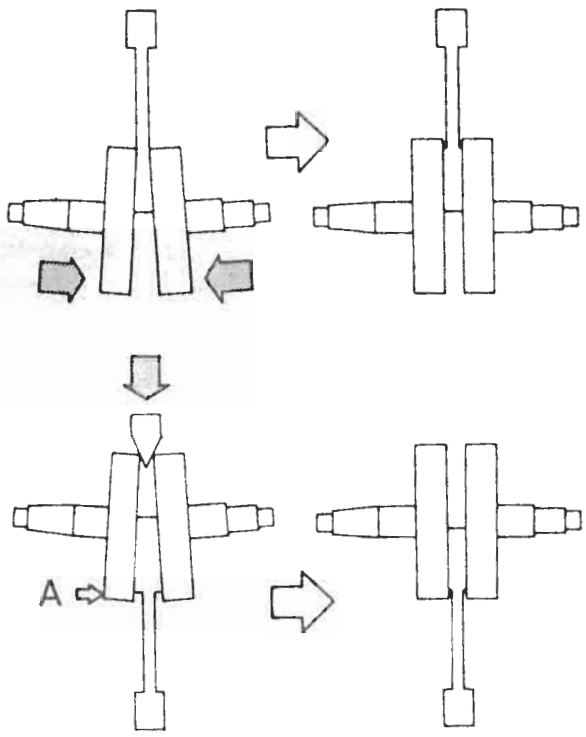
**Horizontal Misalignment**



CAUTION

○**Don't hammer the flywheel at point "A".**

**Vertical Misalignment**

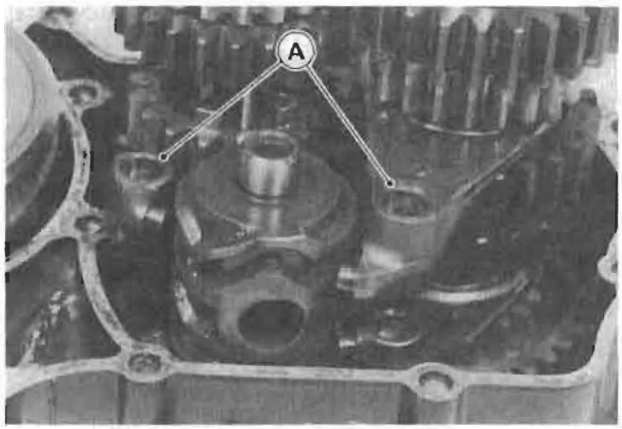



## Transmission

### *Transmission Shaft Removal*

●Split the crankcase (see Crankcase Splitting).

●After removing the shift rods, pull out the shift forks.




A. Shift Forks

●Remove the transmission shafts and the shift drum.

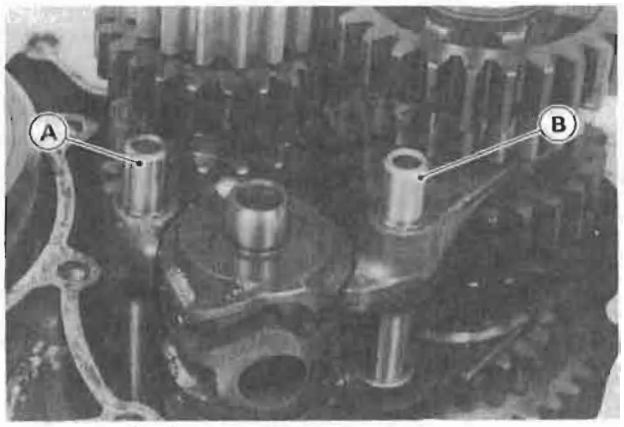
### *Transmission Shaft Installation*

●Set the transmission shafts, shift drum, and shift forks together, and fit them into the right crankcase half.

○Apply transmission oil liberally to the transmission gears, bearings, shaft journals, and shift fork fingers.

○Fit each shift fork into the groove of the proper gear so that the shift fork guide pin is in the proper groove on the shift drum.

●Apply small amount of transmission oil to the shift rods, and install the rods.

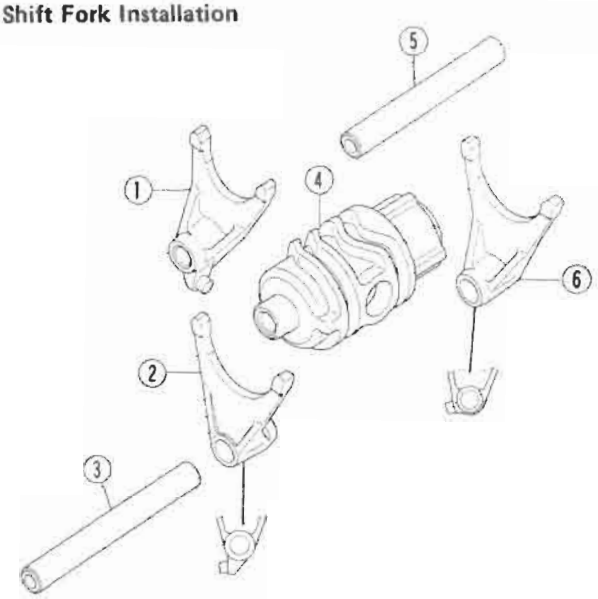



A. Shorter Rod B. Longer Rod

NOTE

○*Be careful not to confuse the shift forks, or the shift rods.*

**Shift Fork Installation**




1. Shorter Shift Fork (Drive Shaft)
2. Left Shift Fork (Output Shaft)
3. Longer Shift Rod (Output Shaft)
4. Shift Drum
5. Shorter Shift Rod
6. Right Shift Fork (Output Shaft)

●Assemble the crankcase (see Crankcase Assembly).

*Transmission Shaft Disassembly*

●Remove the transmission shafts (see Transmission Shaft Removal).

●Using the outside circlip pliers (special tool: 57001-144), remove the circlips and disassemble the transmission shafts completely.

*Transmission Shaft Assembly*

●Use high-flash point solvent to clean the crankcase and the transmission parts.

**WARNING**

○**Clean the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

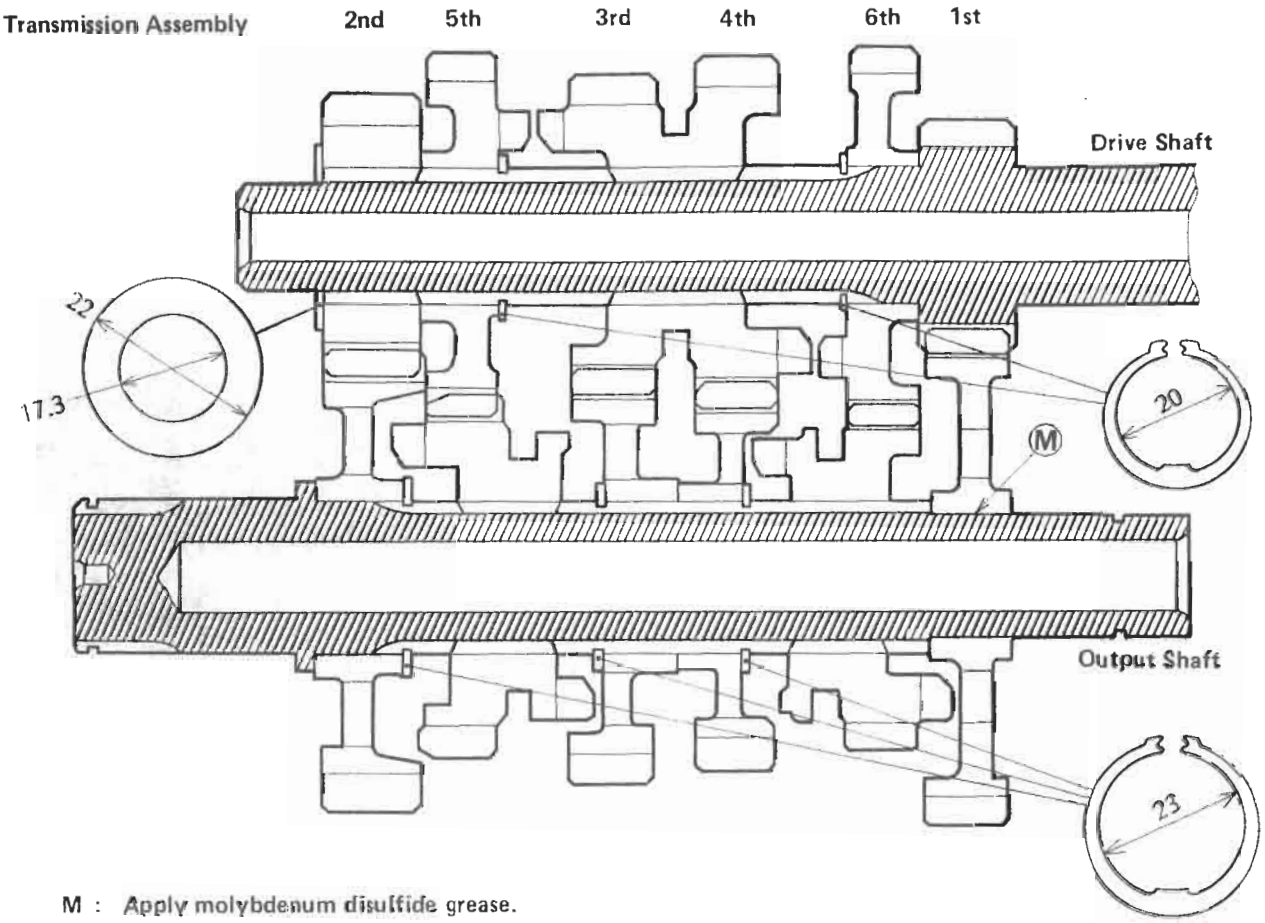
●Apply transmission oil liberally to the transmission shaft, gears and bearings.

●Replace any circlips that were removed with new ones.

○Be careful not to install the gears backwards.

★If the first gear on the output shaft is a new one, apply molybdenum disulfide grease to the internal diameter.

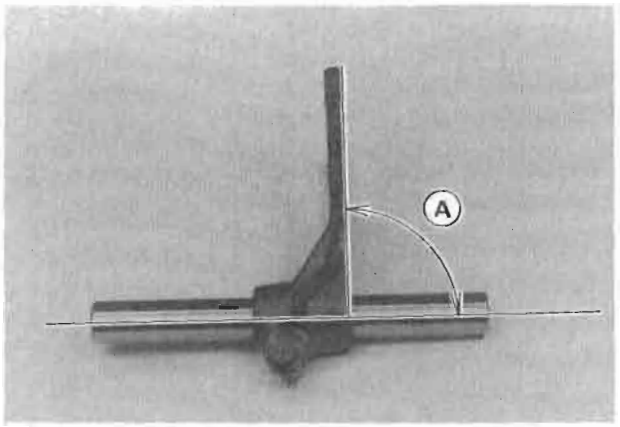
**Transmission Assembly**




M : Apply molybdenum disulfide grease.

*Shift Fork Bending*

•Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.




A. 90°

*Shift Fork/Gear Groove Wear*

•Measure the thickness of the ears on each shift fork, and measure the width of the shift fork grooves on transmission gears.

**Shift Fork Ear Thickness**

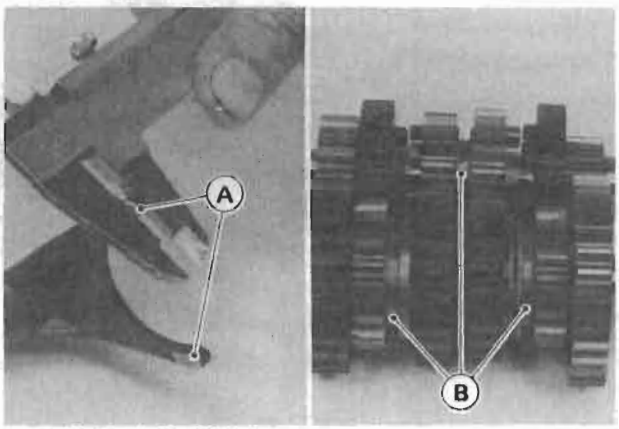
| | |
|---|---|
| **Standard:** | **4.4 – 4.5 mm** |
| **Service Limit:** | **4.3 mm** |

**Gear Shift Fork Groove Width**

| | |
|---|---|
| **Standard:** | **4.55 – 4.65 mm** |
| **Service Limit:** | **4.80 mm** |

★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

★If a gear shift fork groove is worn over the service limit, the gear must be replaced.



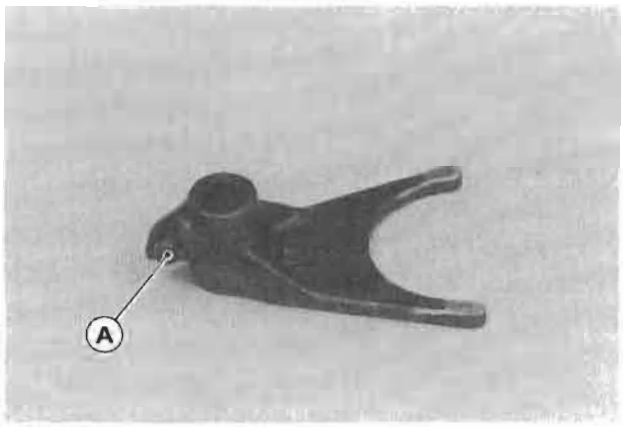

A. Shift Fork Ear Thickness
B. Gear Shift Fork Grooves

*Shift Fork Guide Pin/Shift Drum Groove Wear*

•Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove.

**Shift Fork Guide Pin Diameter**

| | |
|---|---|
| **Standard:** | **5.9 – 6.0 mm** |
| **Service Limit:** | **5.8 mm** |

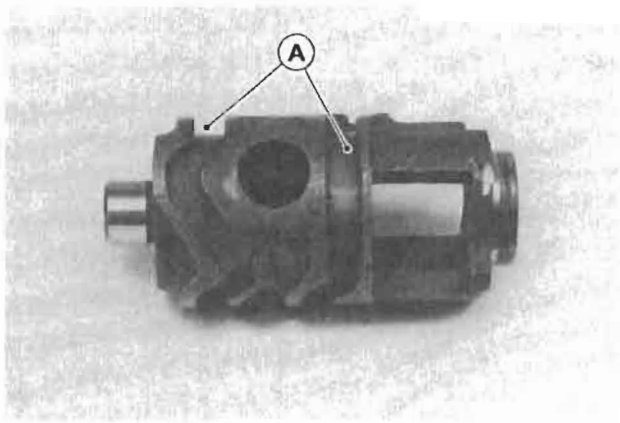



A. Shift Fork Guide Pin

★If the guide pin on any shaft fork is less than the service limit, the fork must be replaced.

**Shift Drum Groove Width**

| | |
|---|---|
| **Standard:** | **6.05 – 6.20 mm** |
| **Service Limit:** | **6.30 mm** |

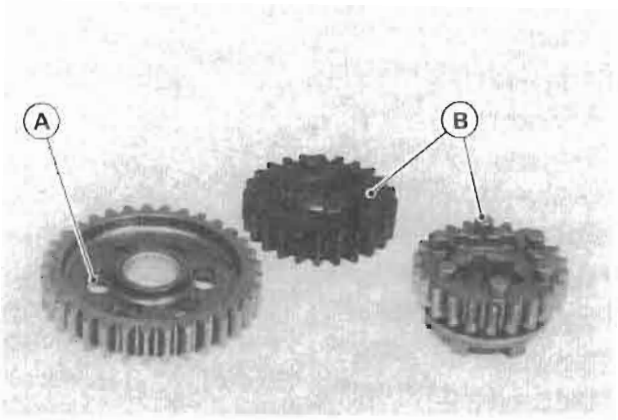



A. Shift Drum Grooves

★If any shift drum groove is worn over the service limit, the drum must be replaced.

*Gear Dog and Gear Dog Hole Damage*

●Visually inspect the gear dogs and gear dog holes. Replace any gears that have damaged or excessively worn dogs or dog holes.




A. Dog Holes B. Dogs

## Oil Seal and Bearing

*Oil Seal and Bearing Removal*

●Remove the bolts and take off the washers on the bearings.

●Using a hook, press, and the bearing driver set (special tool: PN 57001-1129), remove the oil seals and the bearings.

**NOTE**

○*In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.*

**CAUTION**

○**Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.**

*Oil Seal and Bearing Installation*

**WARNING**

○**Clean the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

○If the oil seal was removed, replace it with a new one.

○When installing the oil seals and the bearings, position the crankcase half so that the bearing housing is seated on a suitable press fixture in order to prevent case damage.

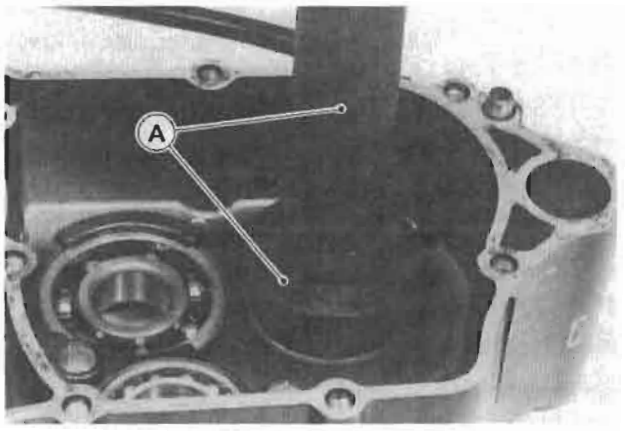
●Press in the oil seals and the following bearings being careful of proper direction (see Exploded View).

Output Shaft Left Bearing
Drive Shaft Right Bearing

●Press in the crankshaft oil seals until they bottom out using a bearing driver from the bearing driver set (special tool).

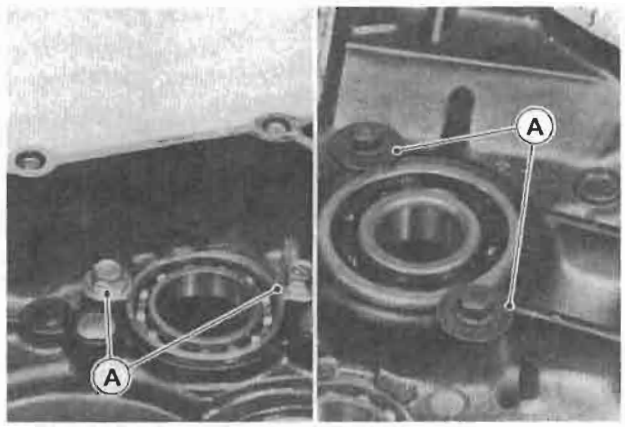
●Press each crankcase bearing until it bottoms out using a bearing driver from the driver set (special tool) which contacts bearing outer race.

●Press in the output shaft oil seal and shift shaft oil seal until they are flush with the outside surface of the boss (see Exploded View).




A. Bearing Driver Set: 57001-1129

●Be sure to install the retainers of the drive shaft right-hand bearing and shift drum bearing.




A. Retainers

●Apply high temperature grease to all the seal lips.

*Ball Bearing Wear Inspection*

•Check the following ball bearings.
Crankshaft Ball Bearings
Drive Shaft Ball Bearings
Output Shaft Ball Bearings
Shift Drum Ball Bearing

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in high-flash point solvent, dry it (do not spin the bearing while it is dry), and oil it with transmission oil.

**WARNING**

○**Clean the bearings in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean the bearings. A fire or explosion could result.**

○Spin the bearing by hand to check its condition.
★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

# Wheels/Tires

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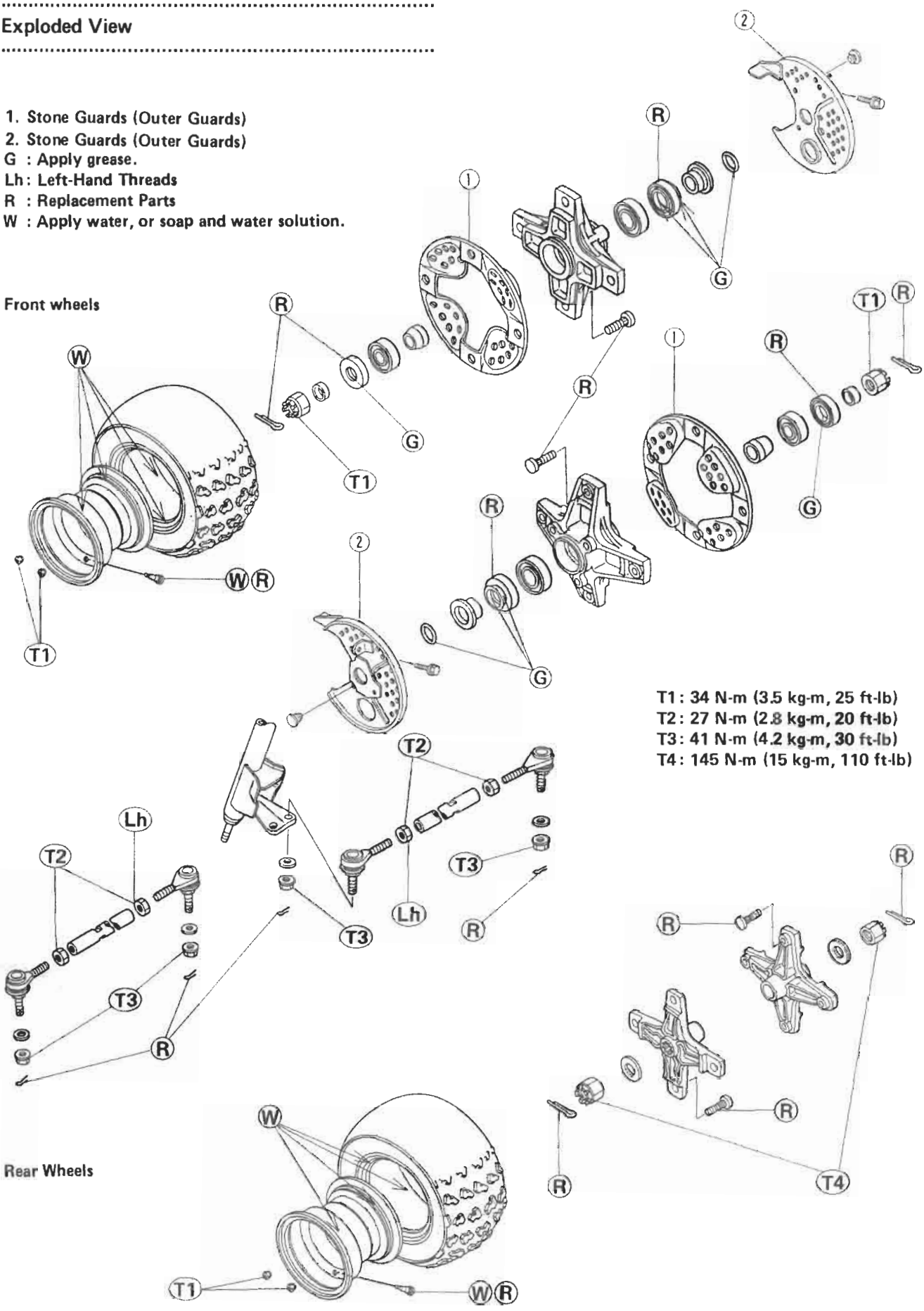
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## Exploded View

1. Stone Guards (Outer Guards)
2. Stone Guards (Outer Guards)

G : Apply grease.
Lh : Left-Hand Threads
R : Replacement Parts
W : Apply water, or soap and water solution.



## Specifications

### Wheel Alignment

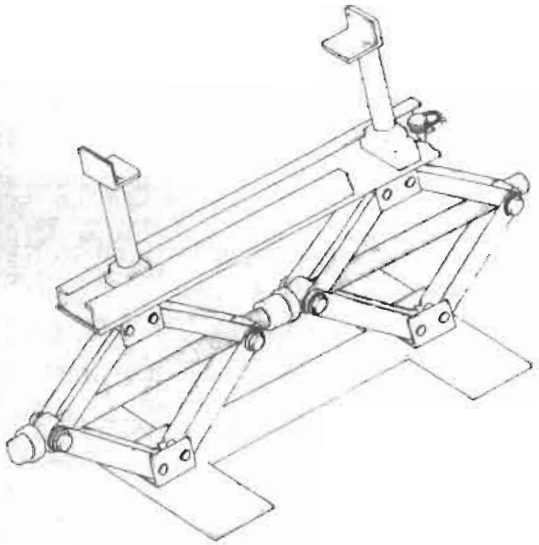
| | | |
|---|---|---|
| Caster | : | 4.5° (non-adjustable) |
| Camber | : | 0.5° @1 G (non-adjustable) |
| Toe-in | : | 20 mm |

### Standard Tire:

| | |
|---|---|
| Front | AT20 x 7.00-10<br>DUNLOP KT926, Knobby/Trail<br>Tubeless |
| Rear | AT20 x 10.00-10<br>DUNLOP KT927, Knobby/Trail<br>Tubeless |
| Tire Payload | 260 lb (118 kg) |
| Tire Air Pressure (when cold) | |
| Front | 32 kPa (0.32 kg/cm$^2$, 4.5 psi) |
| Rear | 28 kPa (0.28 kg/cm$^2$, 4.0 psi) |
| Maximum Tire Air Pressure (to seat beads, when cold) | |
| Front and Rear: | 250 kPa (2.5 kg/cm$^2$, 36 psi) |

## Special Tools

Jack: 57001-1238



Air Pressure Gauge: 52002-1082



Bearing Driver Set: 57001-1129



Tire Irons: 57001-1073



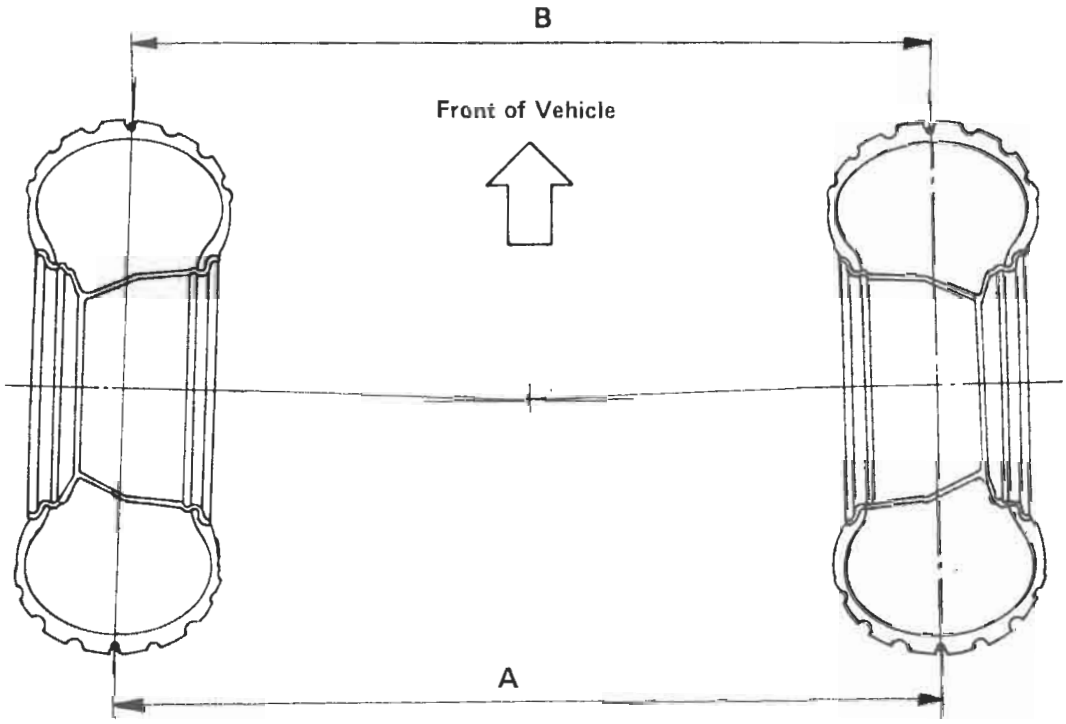
## Wheel Alignment

Toe-in is the amount that the front wheels are closer together in front than at the rear at the axle height. When there is toe-in, the distance **A** is greater than **B** as shown.

The purpose of toe-in is to prevent the front wheels from getting out of parallel at any time, and to prevent any slipping or scuffing action between the tires and the ground. If toe-in is incorrect, the front wheels will be dragged along the ground, scuffing and wearing the tread knobs.

Caster and camber are built-in and require no adjustment.

**Toe-in of Front Wheels**




A – B = Amount of Toe-in
(Distance A and B are measured at axle height)

### *Steering Centering Inspection*

- Test ride the vehicle.
- ★If the handlebar is straight when the vehicle is traveling in a straight line, go on to the Toe-in Inspection procedure.
- ★Otherwise, go on to the Steering Centering Adjustment procedure.

### *Steering Centering Adjustment*

- Support the vehicle so that the front wheels are off the ground and the front axles about the same height as the rear axle.
- Hold a straightedge against the rear wheel rim on one side at axle height.

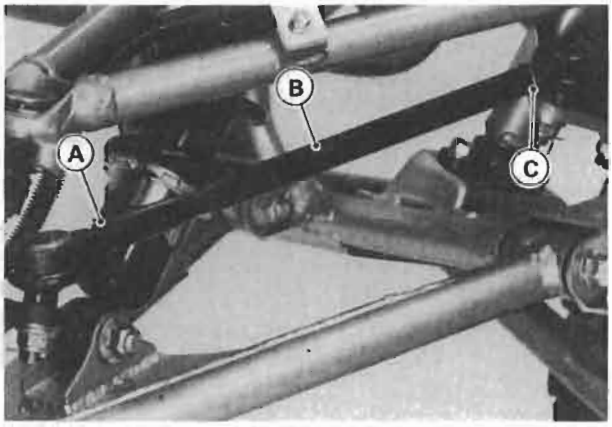



A. Straightedge B. Stand or Jack: 57001-1238

•With the handlebar straight ahead, loosen the locknuts and turn the tie-rod adjusting sleeve the same number of turns on both ends until the front wheel on that side is parallel to the straightedge.

**NOTE**

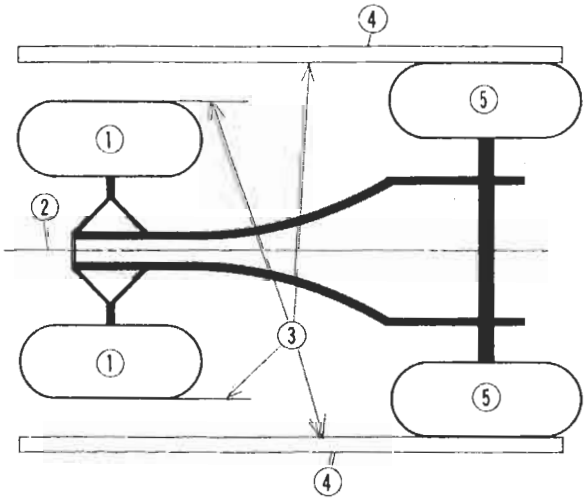
○*The inside locknut on the tie-rod has left-hand threads. Turn the wrench clockwise for loosening.*




A. Outside Locknut
B. Adjusting Sleeve
C. Inside Locknut: left-hand threads

•Repeat the straightedge procedure on the other side of the vehicle. Now the front wheels are parallel to each other and to the center line of the vehicle.

**Steering Centering**




1. Front Wheels
2. Vehicle Center Line
3. Parallel to each other.
4. Straightedge
5. Rear Wheels

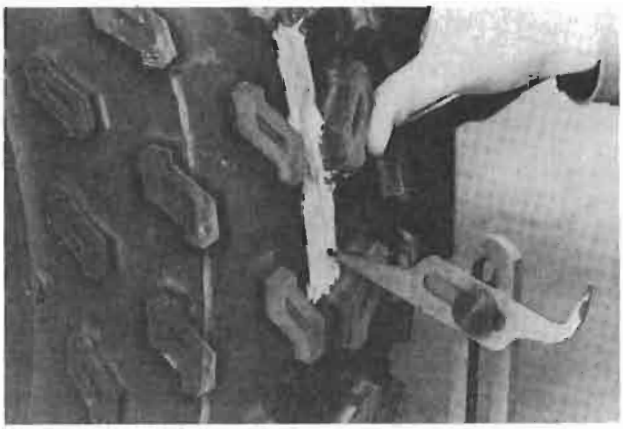
•Go on to the Toe-in Inspection procedure.

*Toe-in Inspection*

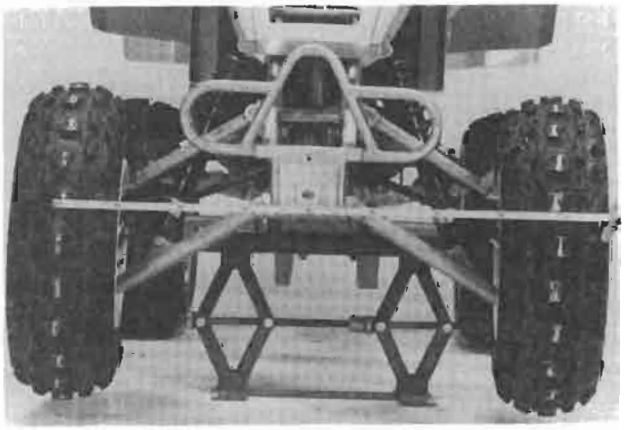
•Support the vehicle on the jack (special tool: 57001-1238 ) or a stand so that the front wheels are off the ground.
•Apply a heavy coat of chalk near the center of the front tires.



•Using a needle nose scriber, make a thin mark near the center of the chalk coating while turning the wheel.



•Keeping the front wheels off the ground, set the handlebar straight ahead.
•At the level of the axle height, measure the distance between the scribed lines for both front and rear of the front tires.



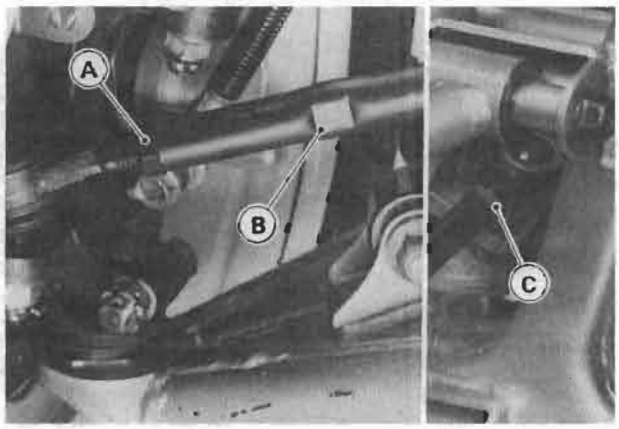
●Subtract the measurement of the front from the measurement of the rear to get the toe-in.
★If the toe-in is not in the specified range, go on to the Toe-in Adjustment procedure.

**Toe-in of Front Wheels**

**Standard: 20 mm**

### *Toe-in Adjustment*

●Loosen the locknuts and turn the adjusting sleeves the same number of turns on both sides to achieve the specified toe-in.

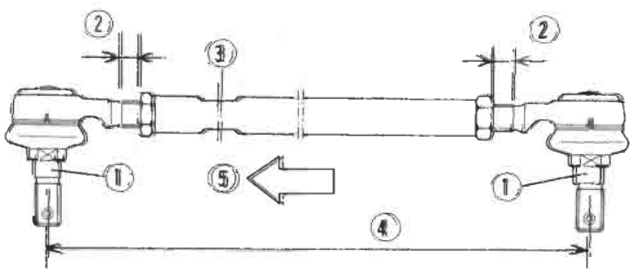



A. Outside Locknut
B. Adjusting Sleeve
C. Inside Locknut: left-hand threads

**NOTE**

○*The inside locknut on the tie-rod has left-hand threads. Turn the locknut clockwise for loosening.*
○*The toe-in will be near the specified value, if the tie-rod length is 329 mm between the tie-rod ends, or if the visible thread length is 0.5 mm on both ends of each tie-rod.*

**Tie-Rod Length Adjustment**



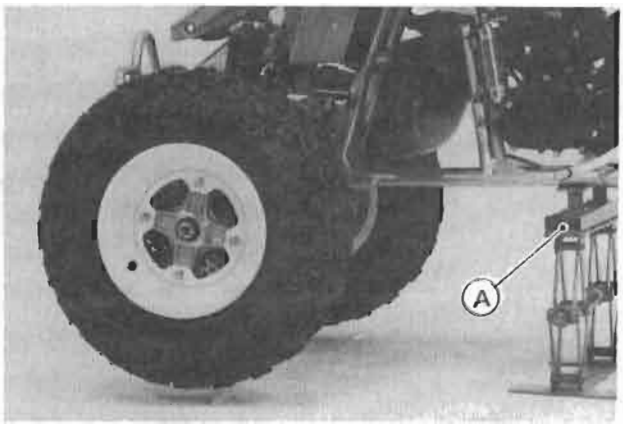

1. Tie-Rod Ends
2. Visible Thread Length
3. Flattened Area
4. Tie-Rod Length
5. Outside

●Check the toe-in (see Toe-in Inspection).
●Tighten the tie-rod locknuts to the specified torque (see Exploded View).
●Test ride the vehicle.

## Wheels (Rims)

### *Wheel Removal*

●Loosen the wheel nuts.
●Support the vehicle on the jack (special tool) or a stand so that the wheels are off the ground.

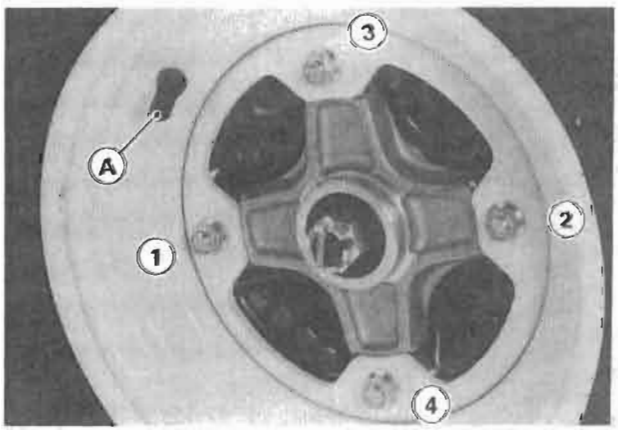



A. Stand or Jack: 57001-1238

●Take off the wheel nuts and remove the wheel.
●To remove the wheel hub, take out the cotter pin and remove the hub nut.

### *Wheel Installation*

●Position the wheel so that the valve stem is toward the outside of the vehicle.
●Mount the wheel on the studs.
●Tighten the wheel nuts in a criss-cross pattern to the specified torque (see Exploded View).

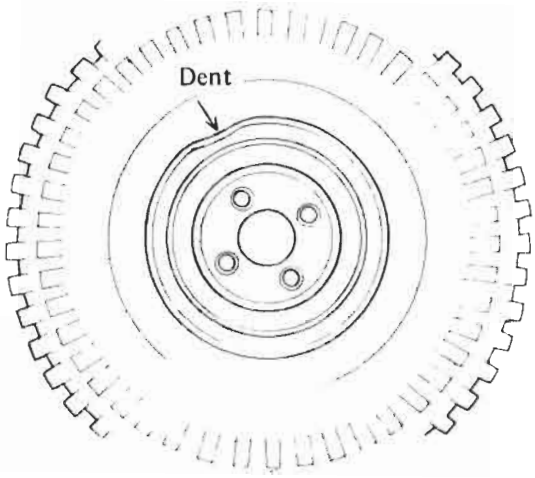



A. Valve Stem

*Wheel Inspection*

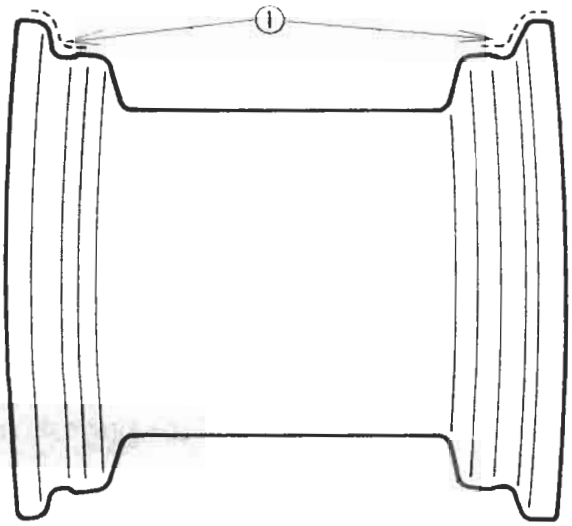
●Examine both sides of the rim for dents. If the rim is dented, replace it.

**Rim Dent**




●If the tire is removed, inspect the air sealing surfaces of the rim for scratches or nicks. Smooth the sealing surfaces with fine emery cloth if necessary.

**Rim Inspection**




1. Sealing Surfaces

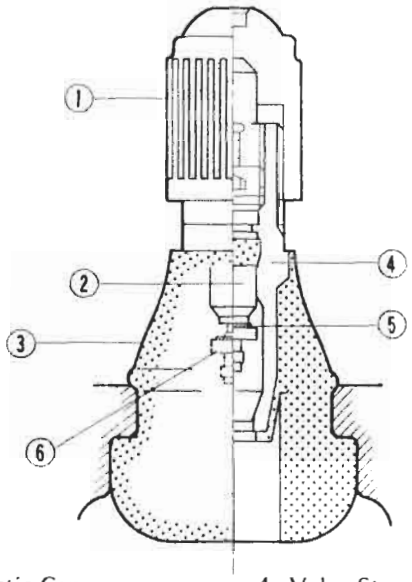
*Wheel Replacement*

●Remove the wheel (see Wheel Removal).
●Disassemble the tire from the rim (see Tire Removal).
○Remove the valve stem and discard it.

CAUTION

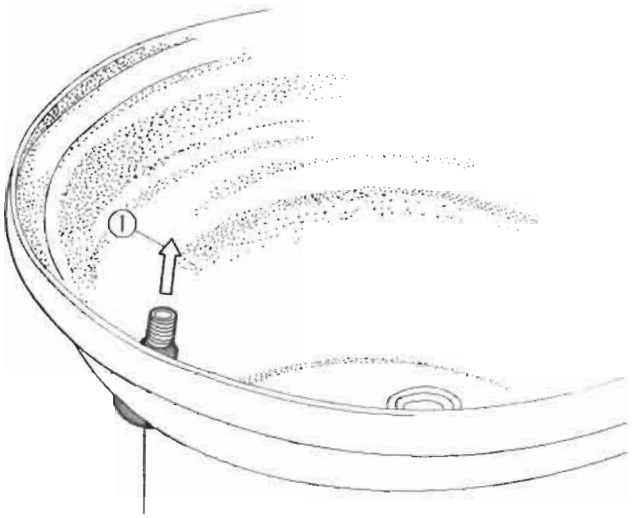
**○Replace the air valve whenever the tire is replaced.**
**○Do not reuse the air valve.**

**Air Valve**




1. Plastic Cap
2. Valve Core
3. Stem Seal
4. Valve Stem
5. Valve Seat
6. Valve Opened

●Install a new air valve in the new rim.
○Remove the valve cap, lubricate the stem with a soap and water solution, and pull the stem through the rim from the inside out until it snaps into place.




1. Pull the stem.

CAUTION

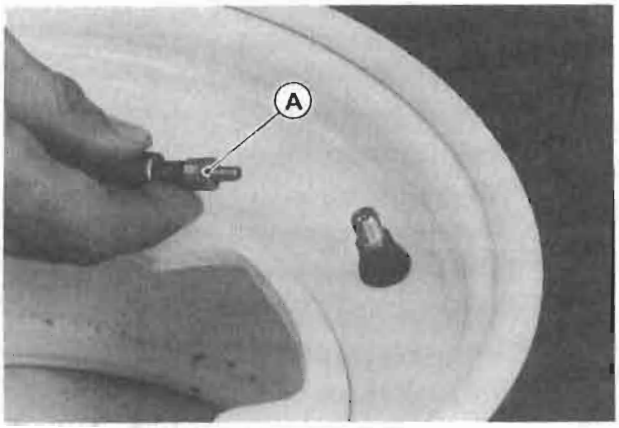
**○Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.**

●Mount the tire on the new rim (see Tire Installation).
●Install the wheel (see Wheel Installation).

## Tires

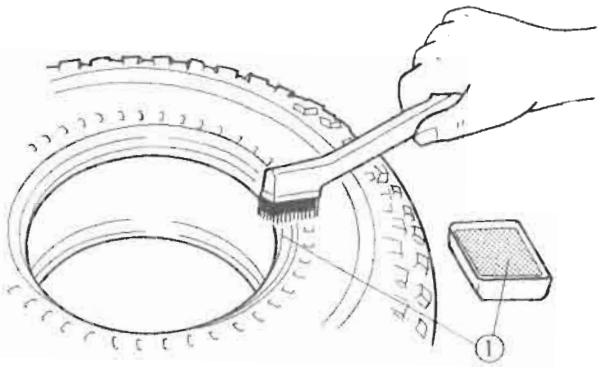
### *Tire Removal*

- Remove the wheel (see Wheel Removal).
- Unscrew the valve core to deflate the tire.
  - Use a proper valve core tool.




A. Valve Core Tool

- Lubricate the tire beads and rim flanges on both sides of the wheel with a soap and water solution, or water. This helps the tire beads slip off the rim flanges.



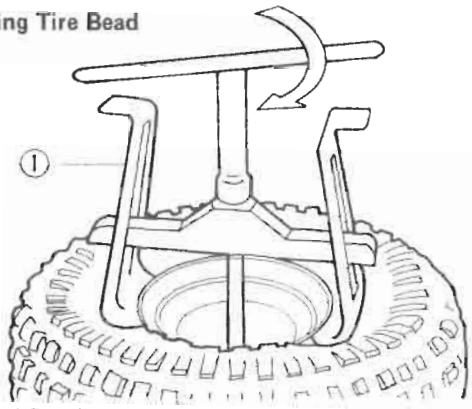

1. Apply lubricant.

**CAUTION**

- **Do not lubricate the tire beads and rim flanges with engine oil or petroleum distillates because they will deteriorate the tire.**

- Break the tire beads away from both sides of the rim with a bead breaker.

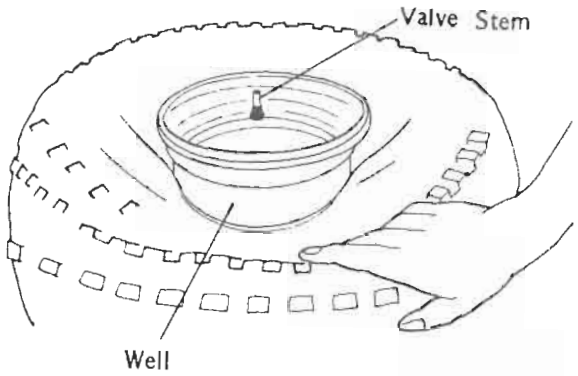
**Breaking Tire Bead**




1. Bead Breaker

- Kneel on the side of the tire, forcing the tire bead into the center well of the rim.

**Rim Removal**

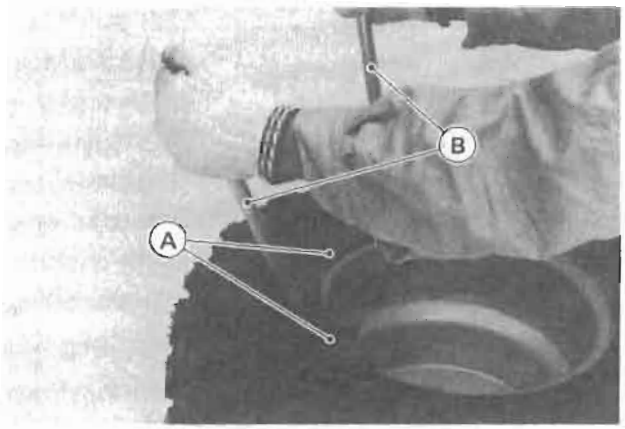



- Lubricate two tire irons (special tool) with a soap and water solution, or water, then pry the bead.

**CAUTION**

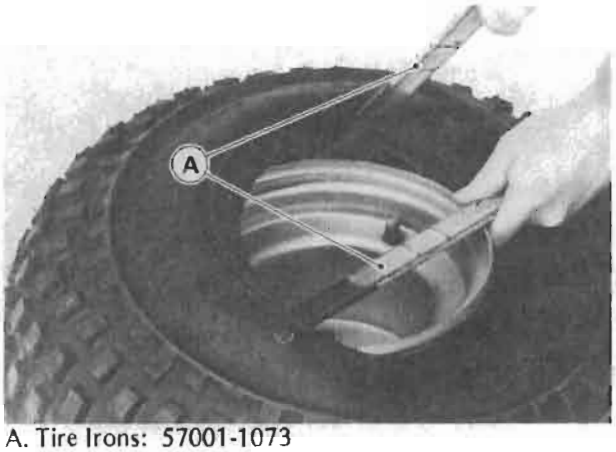
- **Do not scratch the air sealing surfaces of the tire or rim. Scratches or nicks on the sealing surfaces will allow the tire to deflate.**

- When separating the rim from the tire bead with the tire irons, use suitable rim protectors around the valve stem to prevent aluminium rim damage. Split rubber hoses work well.




A. Rim Protectors: Split Rubber Hoses
B. Tire Irons: 57001-1073

●Work around the rim with the tire irons a little at a time, while continuing to hold the bead opposite the irons in the center well of the rim.




A. Tire Irons: 57001-1073

●Lift the second bead up into the center well and use the same procedure as in removing the first bead.

### *Tire Installation*

●Inspect the rim (see Wheel Inspection).
●Check the tire for wear and damage (see Tire Inspection).
●Lubricate the tire beads, rim flanges, and the tire irons (special tools) with a soap and water solution, or water.

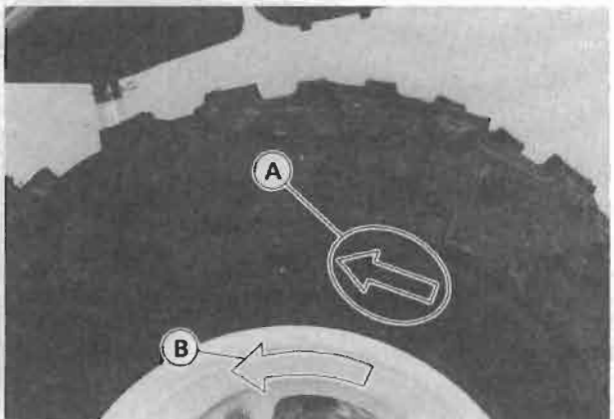
**WARNING**

○**Do not use the lubricant other than a water and soap solution, or water to lubricate the tire beads and rim because it may cause tire separation.**

●Check the tire rotation mark on the front and rear tires, and install them on the rim accordingly.
○The tires should be installed on the rim so that each valve stem is toward the outside of the vehicle.

**NOTE**

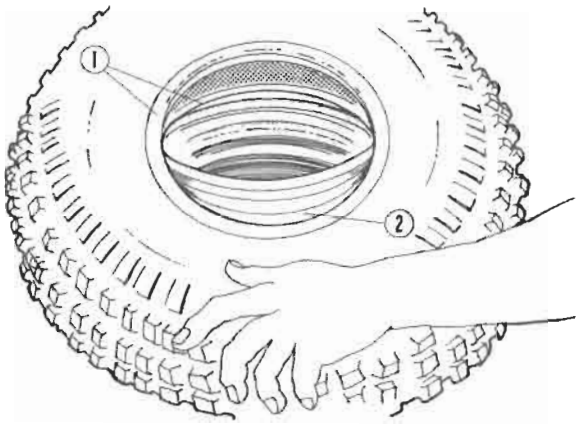
○***The direction of the tire rotation is shown by an arrow on the tire sidewall.***




A. Rotation Mark (Arrow) B. Rotation Direction

●By hand, slide as much of the first bead as possible over the rim flange
○As the bead goes onto the rim, force the bead into the center well of the rim to ease installation.

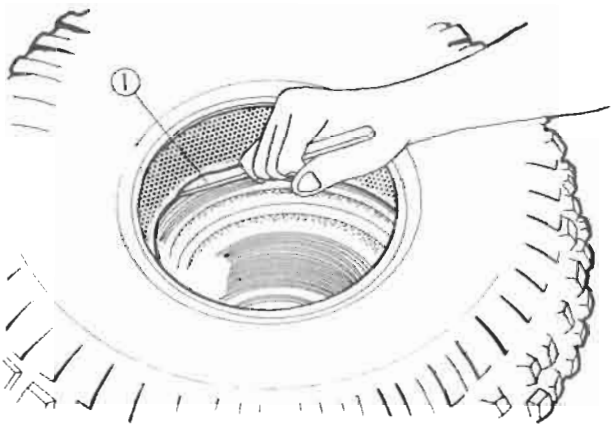
**Bead Installation**




1. Tire Beads 2. Center Well

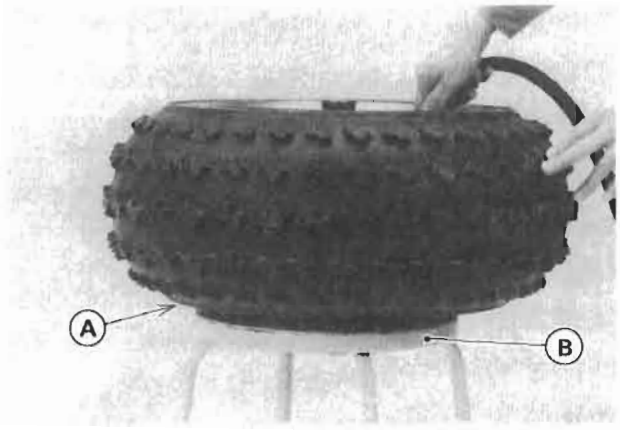
●Use the tire irons (special tools) and suitable rim protectors (eg. rubber tubes) to install the rest of the bead.

**Bead Installation**




1. Tire Irons: 57001-1073

●Use the same procedure to install the second bead.
●Lubricate the tire beads again and center the tire on the rim.
●Support the wheel rim on a suitable stand to prevent the tire from slipping off.




A. Rim B. Suitable Stand

•Inflate the tire until the tire beads seat on the rim.

**Maximum Tire Air Pressure**
**(to seat beads when cold)**
**Front and Rear: 250 kPa (2.5 kg/cm², 36 psi)**

**WARNING**

○**Do not inflate the tire to more than the maximum tire air pressure. Overinflation can explode the tire with possibility of injury and loss of life.**

•Check to see that the rim lines on both sides of the tire are parallel with the rim flanges.



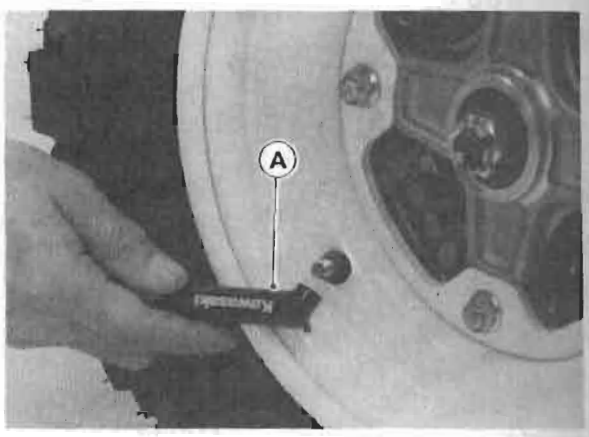

A. Rim Line

•If the rim lines and the rim flanges are not parallel, deflate the tire, lubricate the sealing surfaces again, and reinflate the tire.
•After the beads are properly seated, check for air leaks.
○Inflate the tire to **35 kPa (0.35 kg/cm², 5 psi).** Apply a soap and water solution around the tire bead and check for bubbles.
•Deflate the tire to the specified pressure.

**Tire Air Pressure**

| | |
|---|---|
| **Front:** | **32 kPa (0.32 kg/cm², 4.5 psi)** |
| **Rear:** | **28 kPa (0.28 kg/cm², 4.0 psi)** |

•Check the tire pressure using the air pressure gauge for low air pressure (special tool).




A. Air Pressure Gauge: 52005-1082

•Install the wheel (see Wheel Installation).
•Wipe off the soap and water solution, or water on the tire, and dry the tire before operation.

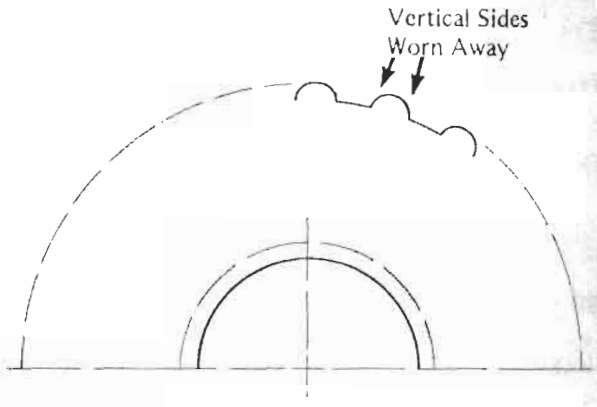
**WARNING**

○**Do not operate the vehicle with the water and soap, or water still around the tire beads. They will cause tire separation, and a hazardous condition may result.**

*Tire Inspection*

•Examine the tire for damage and wear.
○If the tire is cut or cracked, replace it.
○Lumps or high spots on the tread or sidewalls indicate internal damage requiring tire replacement.
○Remove any foreign objects from the tread. After removal, check for leaks with a soap and water solution.
○Check the shape of the tread knobs. If no vertical side is left on the drive side of the knobs, replace the tire.

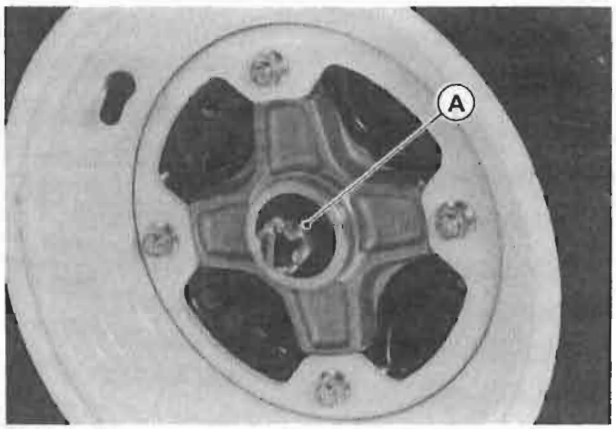
**Tire Inspection**



## Front Hub

### *Front Hub Removal*

●Remove the cotter pin and loosen the hub nut.



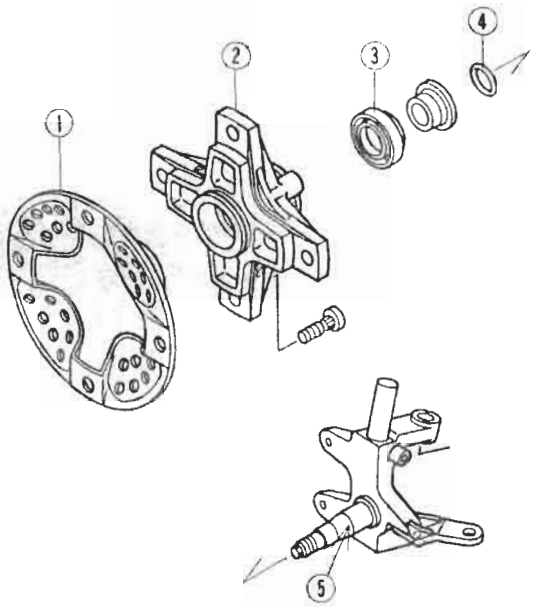

A. Hub Nut

●Pull off the wheel (see Wheel Removal).
●Remove the brake disc guard.
●Remove the caliper by taking off the mounting bolts, and let the caliper hang free.
●Remove the hub nut and pull off the front hub.

### *Front Hub Installation Notes*

●Install the outer guard so that the concave side faces out.
●Be sure to install the O-ring on the knuckle shaft after greasing the O-ring.

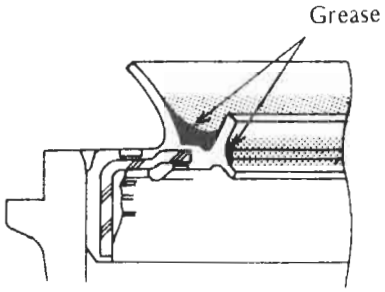
**Front Hub Installation**



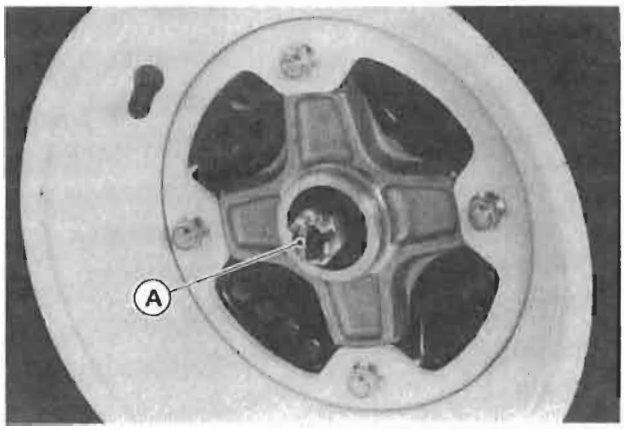

1. Outer Guard
2. Front Hub
3. Hub End Seal
4. O-Ring
5. Knuckle Shaft

●Grease the lips of the hub end seal.

**Hub End Seal Lubrication**



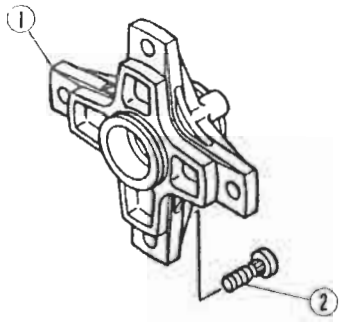

●Tighten the hub nut to the specified torque (see Exploded View).
●Insert a new cotter pin.




A. Cotter Pin

### *Front Hub Disassembly/Assembly Note*

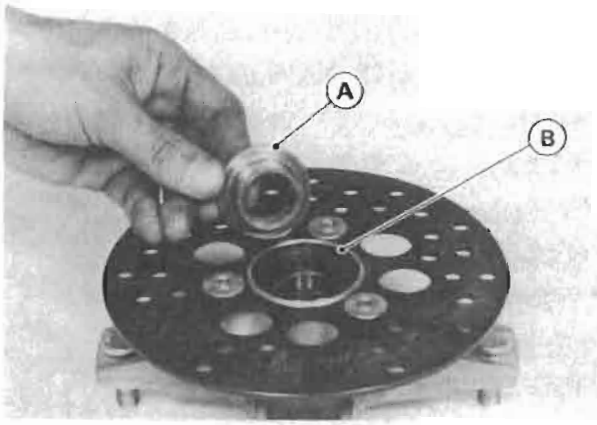
●Do not press the hub bolts out.
★If the hub bolt is damaged, replace the hub and bolts as a unit.




1. Front Hub
2. Hub Bolts

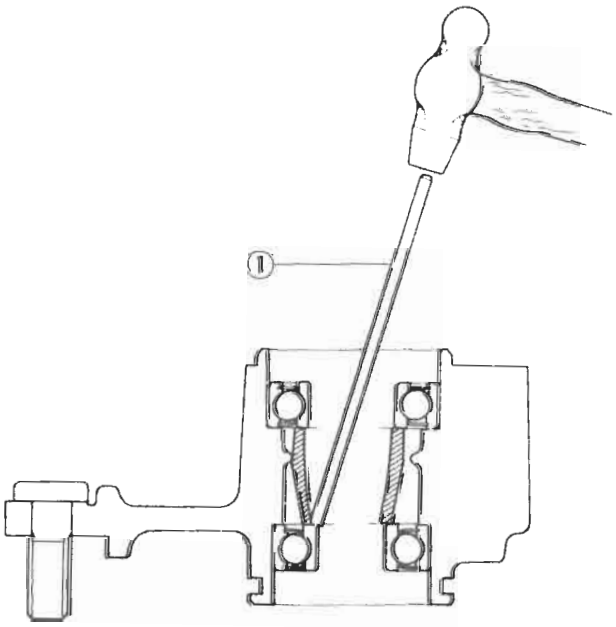
### *Front Hub Bearing Removal Note*

- ●Remove the front hub.
- ●Remove the grease seals, bearings and spacer pipe as follows.
  - ○Pull out the collars on both sides.
  - ○Remove the grease seals using a suitable hook.




A. Collar B. Grease Seal

- ○Pry the spacer pipe toward one side.
- ○Drive the bearing out by tapping on the exposed portion of the spacer pipe end with a hammer and metal rod.

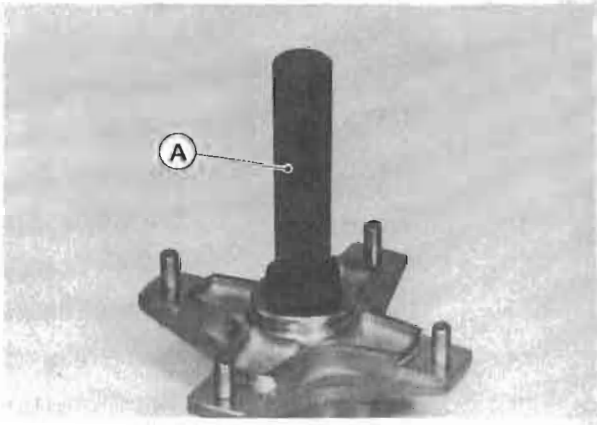



1. Metal Rod

- ○Insert the spacer pipe into the hub assembly.
- ○Drive out the remaining bearing by tapping on the spacer pipe with a suitable driver.
- ●Deburr the spacer pipe as needed.

### *Front Hub Bearing Installation Notes*

- ●Installation is the reverse of removal. Note the following.
- ●Drive either bearing into the hub assembly with the bearing driver set (special tool) until it bottoms out. The maked side of the bearing faces outboard.




A. Bearing Driver Set: 57001-1129

- ●Grease the lips of the grease seals.

### *Front Hub Bearing Inspection*

**NOTE**

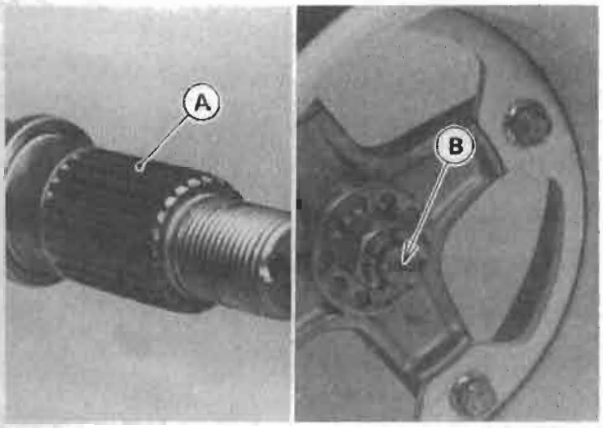
○*Since the bearings are packed with grease and sealed they can not be lubricated.*

- ●Remove the hub assembly (see Front Hub Removal).
- ●Turn each bearing back and forth while checking for roughness or binding.
- ★If roughness or binding is found, replace the bearing.
- ●Examine the bearing seal for tears or leakage.
- ★If the seal is torn or is leaking, replace the bearing.

## Rear Hub

### *Rear Hub Installation*

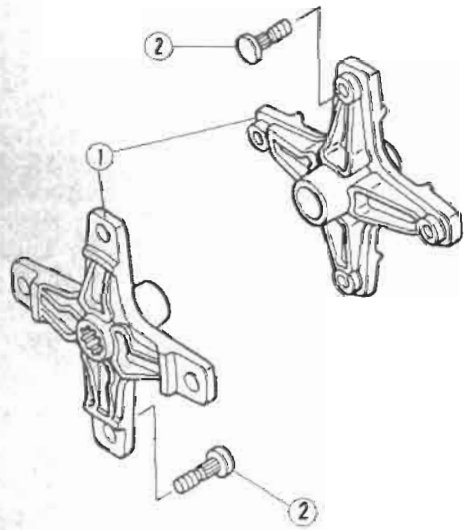
- Apply grease to the axle splines.
- Tighten the rear hub nut to the specified torque (see Exploded View).
- Insert a new cotter pin.




A. Axle Splines B. Cotter Pin

### *Rear Hub Disassembly/Assembly Note*

- Do not press the hub bolts out.
- *If the hub bolt is damaged, replace the hub and bolts as a unit.




1. Rear Hubs 2. Hub Bolts

### *Rear Axle Bearing Removal Installation and Inspection*

- Refer to Rear Axle and Bearing section in the Final Drive chapter.

# Final Drive

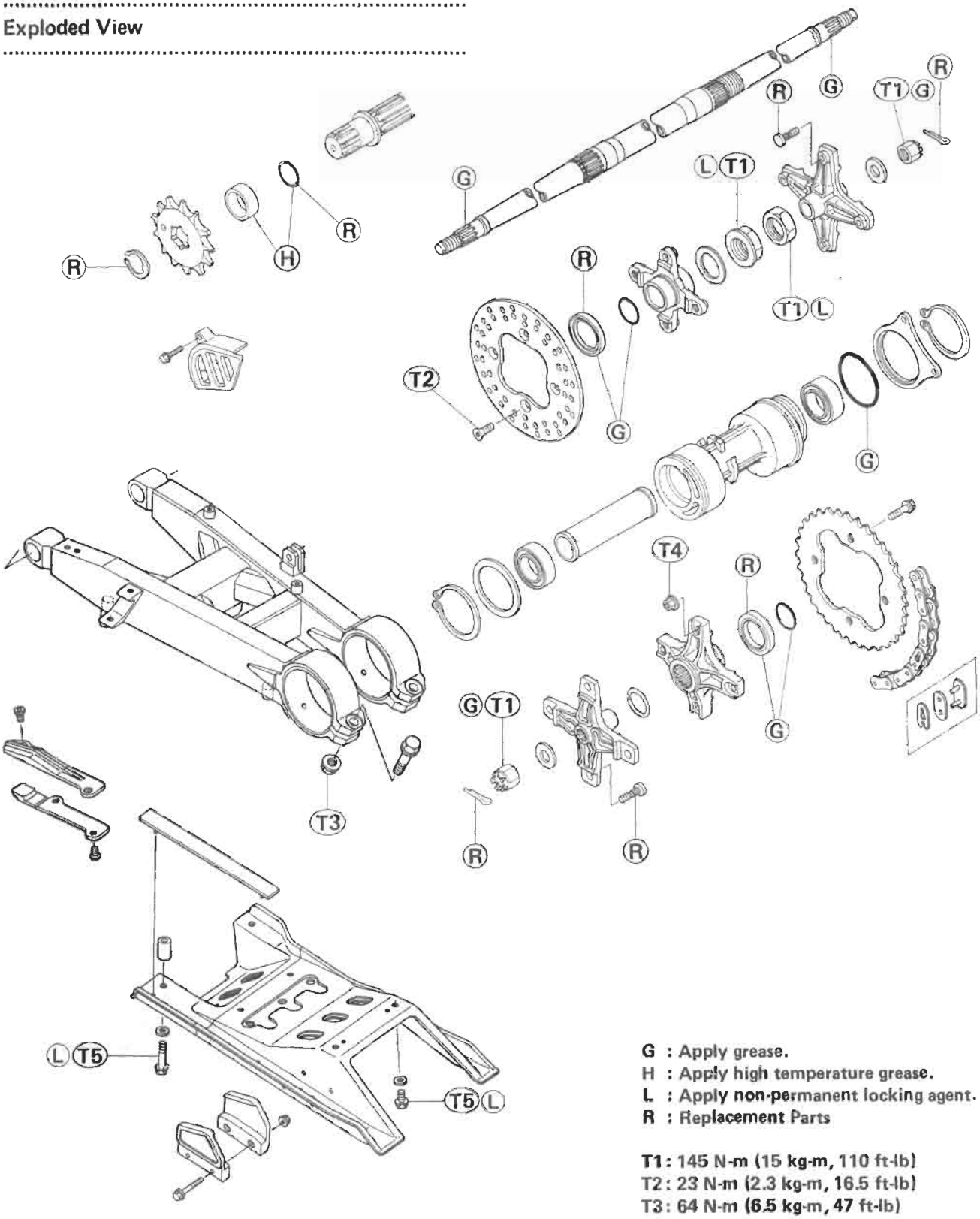
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## Exploded View




G : Apply grease.
H : Apply high temperature grease.
L : Apply non-permanent locking agent.
R : Replacement Parts

T1: 145 N-m (15 kg-m, 110 ft-lb)
T2: 23 N-m (2.3 kg-m, 16.5 ft-lb)
T3: 64 N-m (6.5 kg-m, 47 ft-lb)
T4: 25 N-m (2.5 kg-m, 18.0 ft-lb)
T5: 31 N-m (3.2 kg-m, 23 ft-lb)

**1. Eccentric Chain Adjuster**

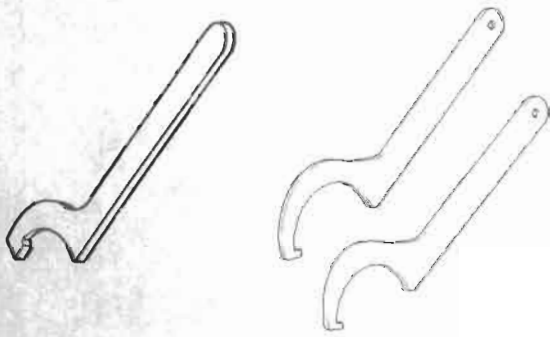
The chain adjusters are eccentric bearing housing in the rear ends of the swing arm. The chain is adjusted just by loosening the bearing housing clamp bolts.

## Specifications

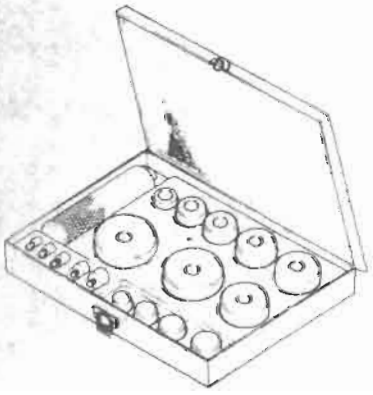
| Item | | Standard | Service Limit |
|---|---|---|---|
| **Drive Chain:** | | | |
| Make and type | | DAIDO K.K. Joint Endless | – – – |
| | | D.I.D. 520VC5 96 Links | – – – |
| Chain slack | | | (Usable range) |
| Chain slack: | | – – – | 45 – 55 mm |
| 20-link length | | 317.5 – 318.2 mm | 324.0 mm |
| **Rear Sprockets:** | | | |
| Teeth No. | S.T.D. | 39 | – – – |
| | Option | 37, 38, 40, 41 | – – – |
| **Rear Axle Shaft:** | | | |
| Runout | | 0.02 mm or under | 0.2 mm |

## Special Tools

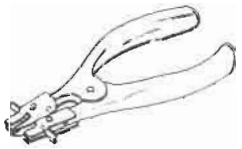
**Hook Wrenches: 92110-1138 (owner's tool) or 57001-1101**



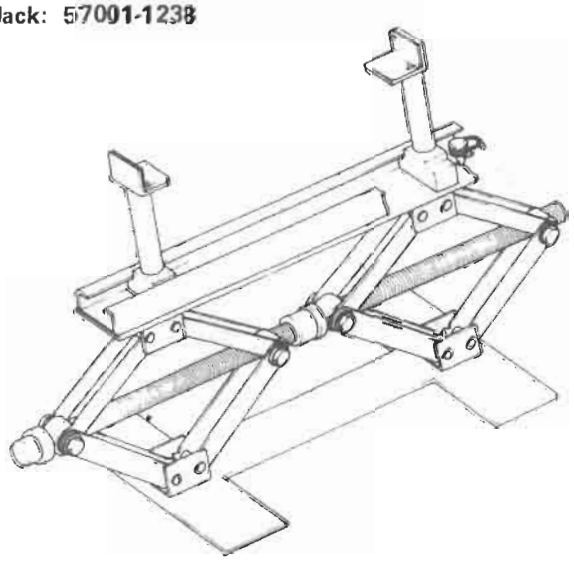
**Bearing Driver Set: 57001-1129**



**Piston Ring Compressor: 57001-115**



**Jack: 57001-1238**



## Drive Chain

The drive chain must be checked, adjusted, and lubricated in accordance with the Periodic Maintenance Chart for safety and to prevent excessive wear. If the chain becomes badly worn or maladjusted – either too loose or too tight – the chain could jump off the sprockets or break.

**WARNING**

○**A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheels, severely damaging the vehicle and causing it to go out of control.**

### *Drive Chain Slack Inspection*

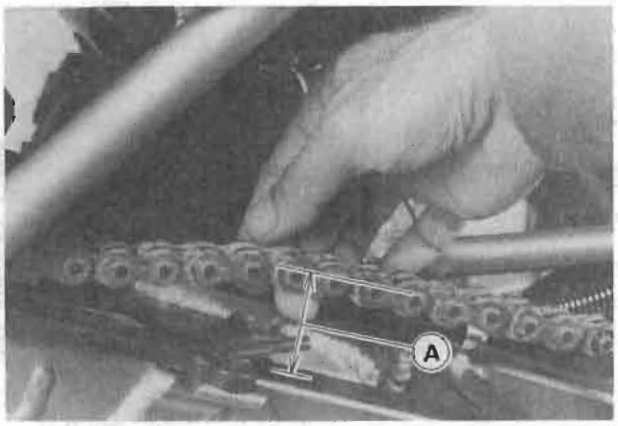
●Stop the engine.

**WARNING**

○**To prevent injury, never try to measure chain slack when the engine is running or the rear wheels are turning.**

●Using the jack (special tool: 57001-1238) or a stand under the frame, lift the rear wheels off the ground to leave the rear shock absorber fully extended.

●Check the amount of chain slack at the point shown below with your finger by firmly pulling up the chain. There should be **45 – 55 mm** of slack. If there is less than **45 mm** or more than **55 mm** of slack, adjust the chain slack.



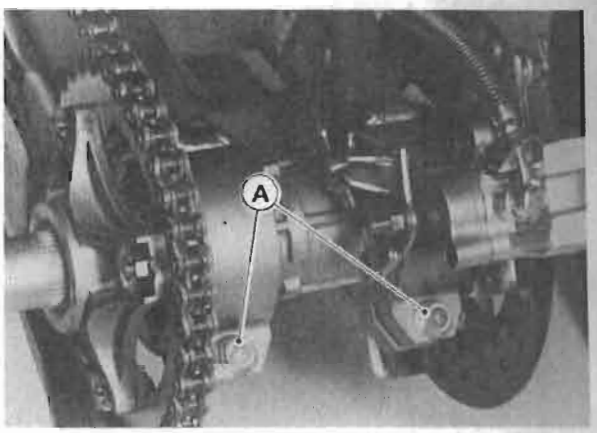

A. Drive Chain Slack

**Drive Chain Slack**

| | |
|---|---|
| **Usable Range:** | **45 – 55 mm** |
| **Too Tight:** | **less than 45 mm** |
| **Too Loose:** | **more than 55 mm** |

### *Drive Chain Slack Adjustment*

●Loosen the clamp bolts and nuts on both ends of the swing arm.

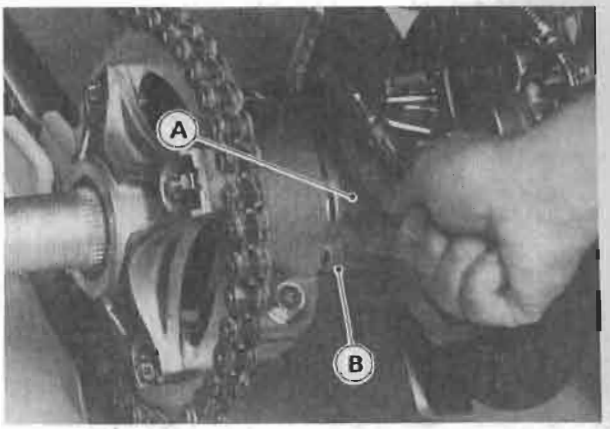



A. Chain Adjuster Clamp Bolts and Nuts

**NOTE**

○*It is not necessary to loosen the torque link nuts.*

●Using the hook wrench (special tool or owner's tool), turn the bearing housing forward or rearward until the drive chain has the correct amount of chain slack.



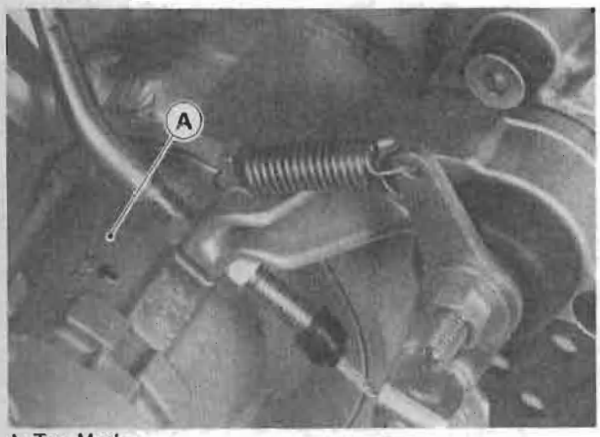

A. Hook Wrench: 92110-1138 (owner's tool), or 57001-1101
B. Bearing Housing (eccentric chain adjuster)

**NOTE**

○*Be sure not to position the axle at the top of the eccentric bearing housing. When the axle is the correct position, the* **TOP** *mark on the housing should be on top.*

**CAUTION**

○**Do not overtighten the chain. Overtightening will cause accelerated wear to engine and driveline components.**




A. Top Mark

•Tighten both clamp nuts to the specified torque (see Exploded View)

**WARNING**

○**If the clamp nuts are not securely tightened, an unsafe riding condition may result.**

*Drive Chain Wear Inspection*

•Turn the rear wheels to inspect the drive chain for damaged rollers and loose pins and links.

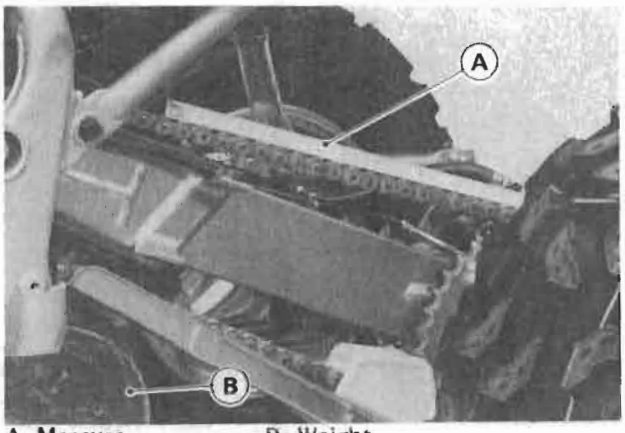
•Also inspect the sprockets for unevenly or excessively worn or damaged teeth (see Engine Sprocket Wear in the Engine Left Side or Rear Sprocket Wear).

★If there is any irregularity, replace the drive chain and both sprockets.

★If the chain appears dry, lubricate it.

•Stretch the chain taut either by adjusting the chain slack, or by hanging a **10 kg** weight on the chain.

•Measure the length of 20 links on the straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the chain may wear unevenly take measurements at several places.




A. Measure B. Weight

★If any measurement exceeds the service limit, replace the chain. Also replace the engine and rear sprockets when the drive chain is replaced.

**Drive Chain 20-Link Length**

| | |
|---|---|
| **Standard:** | **317.5 – 318.2 mm** |
| **Service Limit:** | **324 mm** |

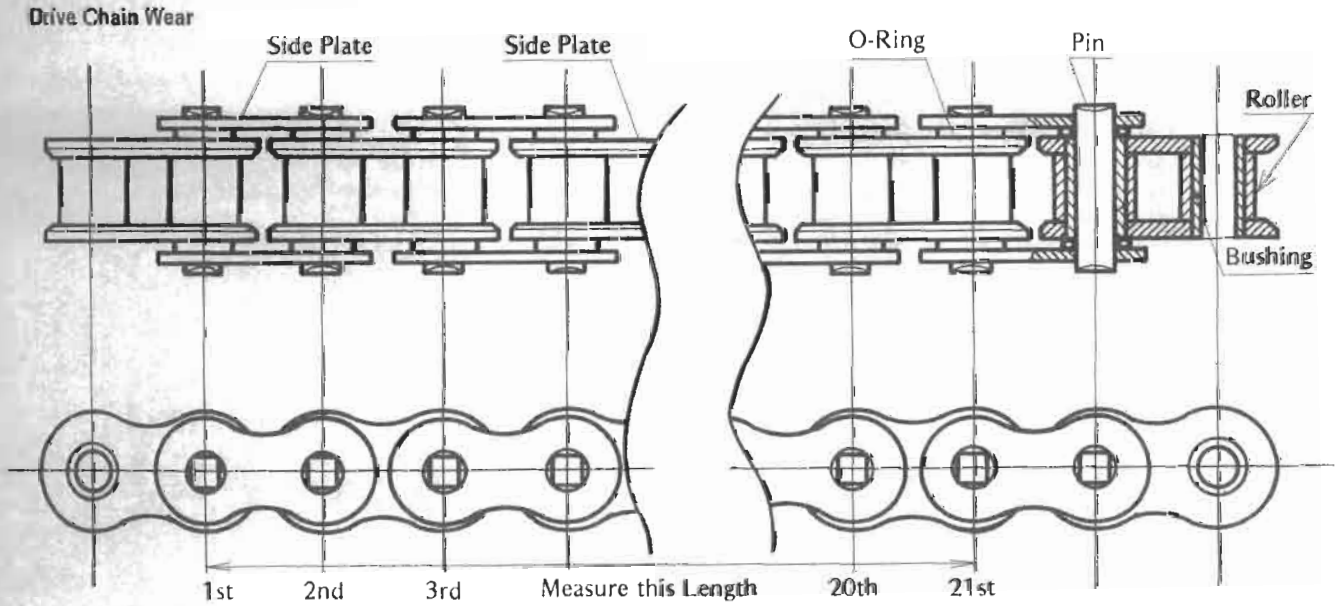
**WARNING**

○**For safety, use only the standard chain.**

**Standard Drive Chain**

| | |
|---|---|
| **Make:** | DAIDO K.K. |
| **Type:** | **Joint endless D.I.D. 520 VC5** |
| **Link:** | **96 links** |

**Drive Chain Wear**



### *Drive Chain Lubrication*

•If the chain appears especially dirty, it should be cleaned before lubrication.

**WARNING**

**○Do not lubricate the chain while the engine is running. The vehicle could fall from the jack or a stand, causing personal injury.**

**CAUTION**

**The O-rings between the side plates seal the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.**

**○Use only kerosene or diesel oil for cleaning an O-ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-rings.**

**○Immediately blow the chain dry with compressed air after cleaning.**

**○Completely clean and dry the chain within 10 minutes.**

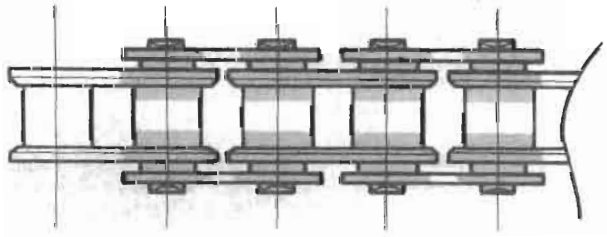
•Support the rear of the vehicle on the jack (special tool) or a stand with both rear wheels off the ground. Turn the wheels slowly while oiling the chain.

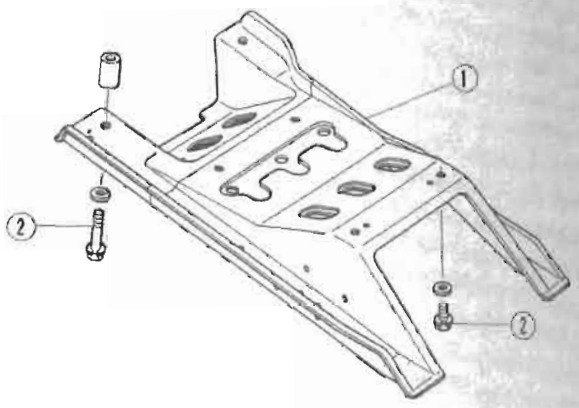
•Use a heavy oil, such as **SAE 90 gear oil**, to lubricate the chain.

•Apply oil to the side of the rollers so that oil will penetrate the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.

•Wipe off any excess oil.

**Drive Chain Lubrication** **Oil Application Areas**





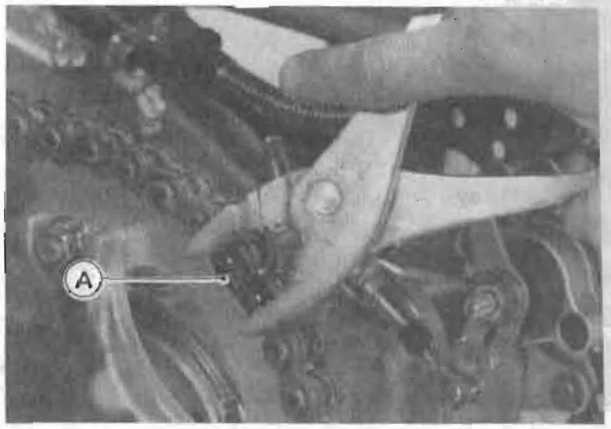

1. Chain Guard
2. Bolts

### *Drive Chain Removal*

•Turn the bearing housing so that the chain is loose.

•Remove the engine sprocket cover.

•Remove the clip from the drive chain master link using pliers, and remove the master link.




A. Master Link Clip

•Free the drive chain from the sprockets, being careful that the chain does not get dirty from contact with the ground.

### *Chain Guard Bolts Tightness Inspection*

•Check the tightness of the chain guard bolts in accordance with the Periodic Maintenance Chart (see the General Information chapter).

★If the bolts have loosened, take them out, apply non-permanent locking agent to the threads and tighten them to the specified torque (see Exploded View).

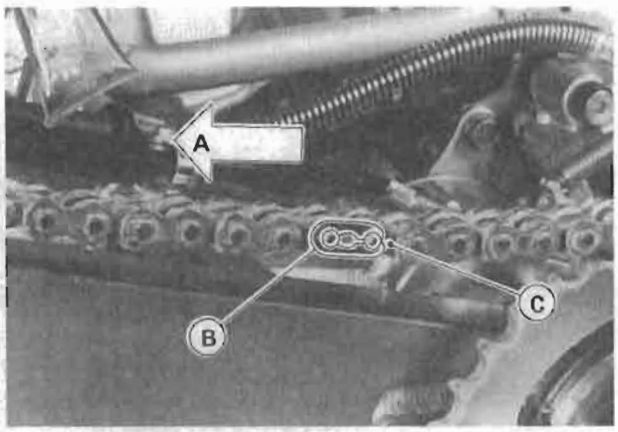
### *Drive Chain Installation Notes*

•Installation is the reverse of removal.

•Fit the drive chain back onto the sprockets with the ends at the rear sprocket.

•Install the master link.

•Install the clip so that the open end faces away from the direction of chain rotation.




A. Direction of Chain Rotation
B. Clip
C. Open End

**WARNING**

○**Incorrect installation of the master link clip can allow it to catch on an adjacent part. If the clip dislodges, the chain could come apart, and this could result in rear wheel lockup and loss of control.**

●Adjust the drive chain slack (see Drive Chain Slack Adjustment).
●Check the brake for weak braking power, and brake drag (see Brakes chapter).
★If necessary, adjust the parking brake (see Parking Brake Adjustment in the Brakes chapter).

## Sprockets

### *Engine Sprocket Removal/Installation*

●Refer to the Engine Left Side chapter.

### *Rear Sprocket Removal Note*

●Remove the rear axle (see Rear Axle Removal).
●Remove the rear sprocket from the flange by taking off the mounting nuts.

### *Rear Sprocket Wear*

●Visually inspect the rear sprocket teeth.
★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain and engine sprocket (see Drive Chain Wear Inspection).

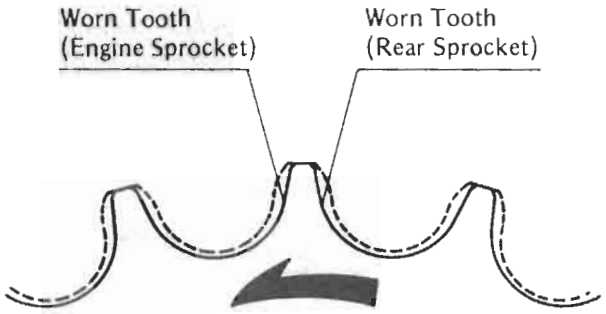
**CAUTION**

○**If a sprocket requires replacement, the drive chain is probably worn also. Upon replacing the rear sprocket, inspect the chain and engine sprocket.**

**NOTE**

○*Sprocket wear is exaggerated for illustration.*

**Sprocket Teeth**

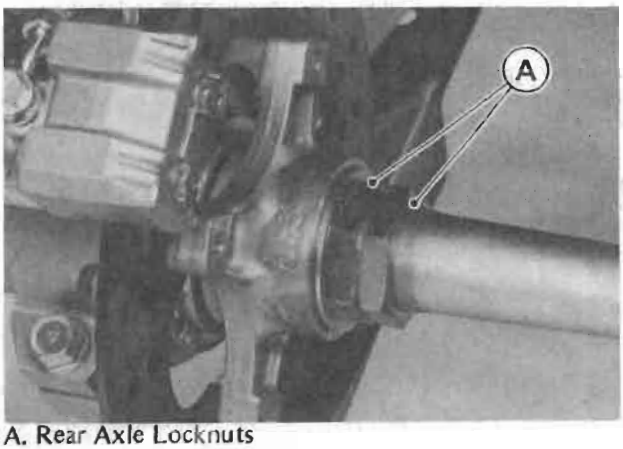



Direction of Rotation

## Rear Axle and Bearing

### *Rear Axle Locknuts Tightness Inspection*

●Check the tightness of the rear axle locknuts in accordance with the Periodic Maintenance Chart (see the General Information chapter).

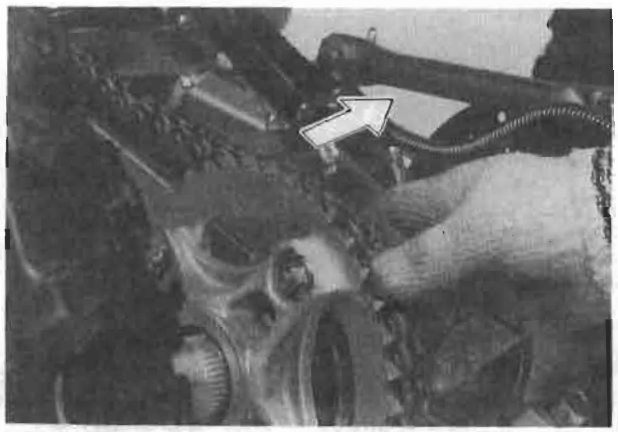



A. Rear Axle Locknuts

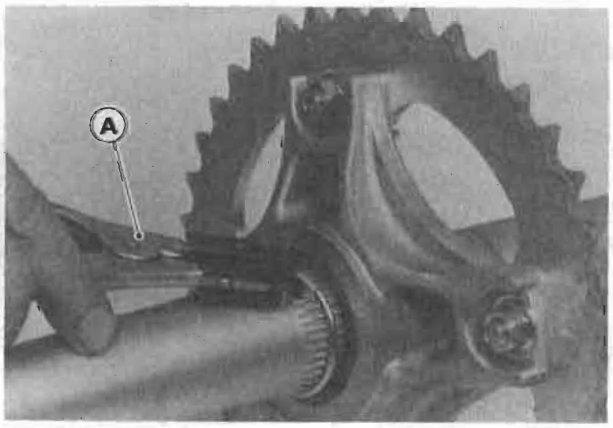
★If any rear axle locknuts have loosened, reinstall the rear axle, apply non-permanent locking agent to the threads of the nuts, and tighten them to the specified torque (see Exploded View).
☆Refer to Rear Axle Installation Notes for axle locknut tightening.

*Rear Axle Removal*

•Loosen the drive chain and remove it from the rear sprocket toward the vehicle's right side.



•Remove the following parts
Chain Guard
Drive Chain (just remove it from the rear sprocket)
Rear Caliper (just remove it from the disc)
Rear Axle Locknuts (use common hand tool)
Disc and Disc Holder
•Support the rear of the vehicle on the jack stand (special tool: PN 57001-1238) or a stable stand with both rear wheels off the ground.
•Remove the rear wheels and hubs.
•Push the rear axle out toward the vehicle's left side.
•If necessary, remove the sprocket flange ring using the piston ring compressor (special tool).

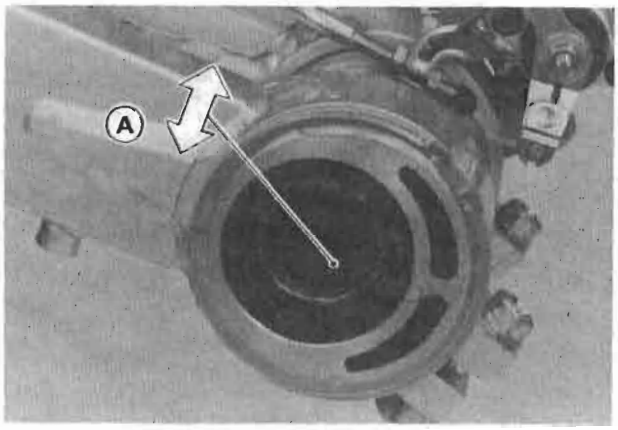



A. Piston Ring Compressor: 57001-115

•Remove the rear sprocket flange.

*Rear Axle Installation Notes*

○Installation is the reverse of removal. Note the following.
•Check that the spacer pipe does not have any axial play between the bearings.




A. Axial Play of Spacer Pipe

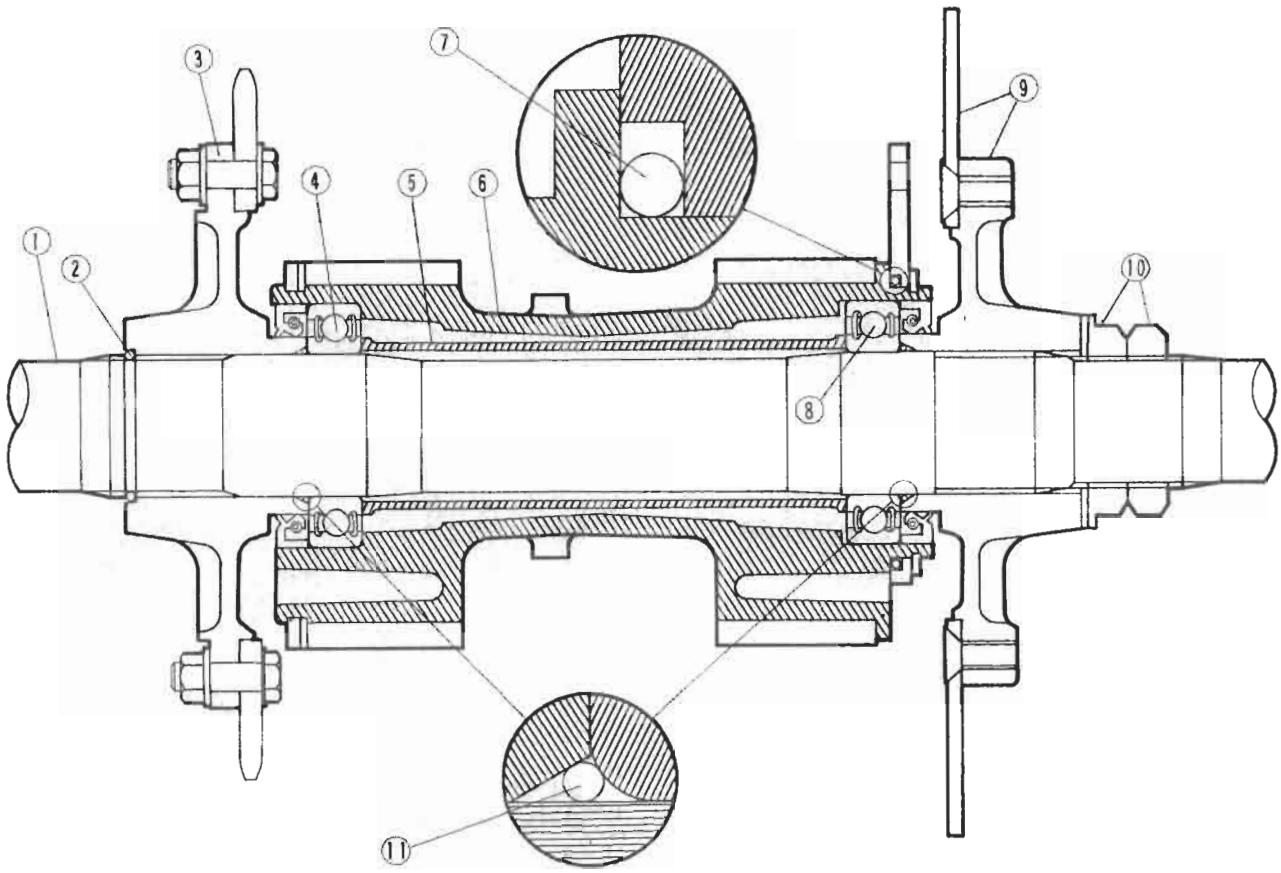
★If the spacer pipe has any axial play, remove the grease seals and seat the left bearing to eliminate the axial play of the spacer collar (see Rear Axle Bearing Installation Notes).

**CAUTION**

○**Since the left bearing may slide out a little during axle removal, be sure to check the axial play of the spacer collar before installation. This operation prevents axle locknuts from loosening.**

•Apply molybdenum disulfide to the following parts.
Right and Left Housing Grease Seal Lips
O-Rings next to Bearings
Rear Axle Splines
•Be sure to install the ring and the left-hand O-ring on the axle.
•Install the rear axle.
•Be sure to install the right-hand O-ring next to the right-hand bearing.
•Install the disc and disc holder.
•Apply non-permanent locking agent to the threads of the axle locknuts. First, tighten the flanged locknut against the disc holder to the specified torque (see Exploded View).
•Tighten the other axle locknut to the specified torque (see Exploded View).

**Rear Axle and Bearing Housing**




1. Rear Axle
2. Sprocket Flange Ring
3. Rear Sprocket Flange
4. Left Bearing
5. Spacer Pipe
6. Bearing Housing
7. O-Ring
8. Right Bearing
9. Disc and Disc Holder
10. Rear Axle Locknuts
11. Left-Hand and Right-Hand O-Rings

### *Rear Axle Runout Inspection*

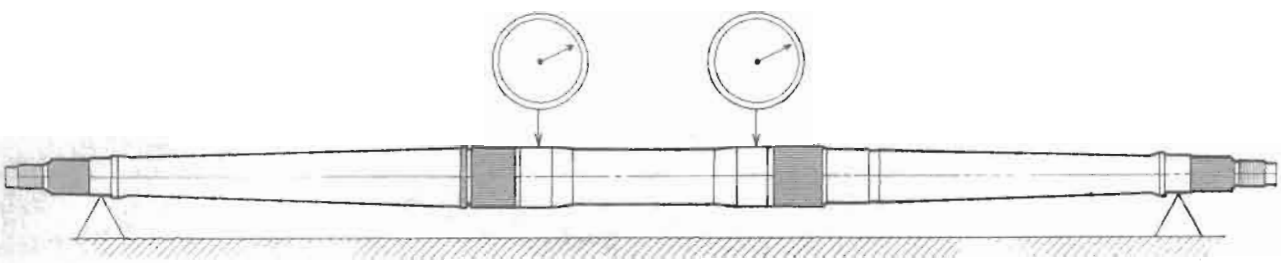
- Measure rear axle runout by supporting the axle on V blocks and setting a dial gauge against the axle at each point shown.
- Turn the axle slowly. The difference between the highest and lowest dial gauge readings is the axle run-out.

★If the runout exceeds the service limit, replace the axle.

**Rear Axle Runout**

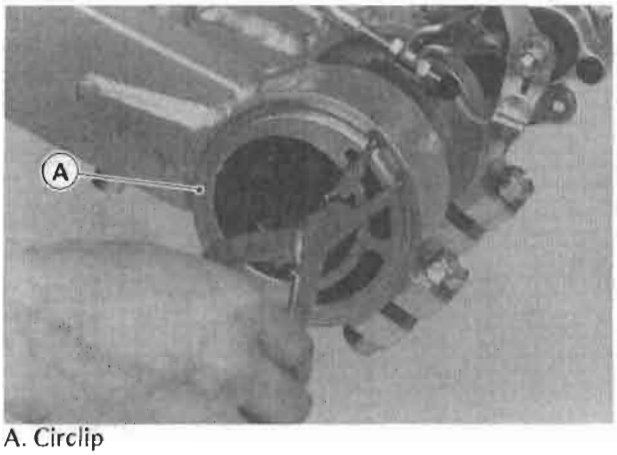
| | |
|---|---|
| **Standard:** | **0.02 mm or under** |
| **Service Limit:** | **0.2 mm** |

**Rear Axle Runout**



### *Bearing Housing Removal*

●Remove the rear axle (see Rear Axle Removal).
●Remove the left-hand circlip on the housing using circlip pliers (common hand tool).




A. Circlip

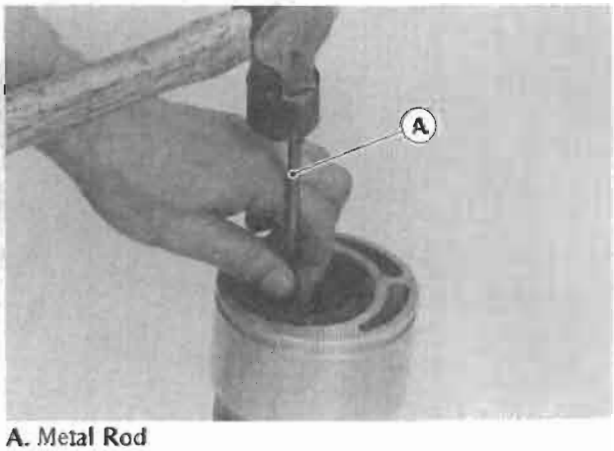
●Tap the bearing housing and caliper bracket out of the swing arm.

### *Rear Axle Bearing Removal*

**NOTE**

○*Since the bearings are packed with grease and shielded, it is not necessary to remove them for lubrication.*

●Remove the bearing housing (see Bearing Housing Removal).
●Pry the spacer pipe toward one side.
●Support the bearing housing on wooden blocks to allow bearing removal.
○Drive the bearing out by tapping on the exposed portion of the spacer pipe end with a hammer and metal rod. The grease seal may be tapped out with the bearing.

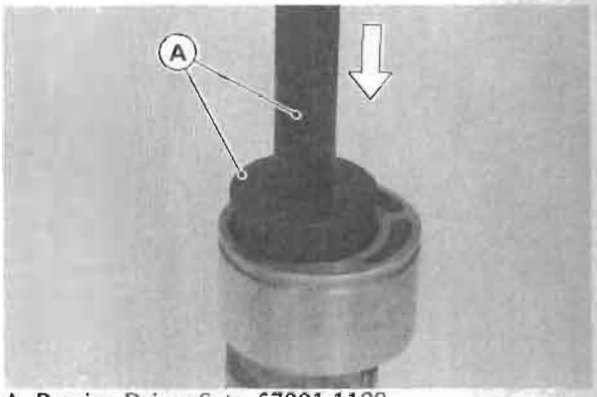



A. Metal Rod

○Insert the spacer pipe into the bearing housing.
○Drive out the remaining bearing and grease seal by tapping on the spacer pipe with a suitable driver.
●Deburr the spacer pipe as needed.

### *Rear Axle Bearing Installation Notes*

●First, press the left bearing (sprocket side) in until it bottoms out using the bearing driver set (special tool).
○Use the bearing which contacts the bearing outer race.




A. Bearing Driver Set: 57001-1129

●Insert the spacer pipe and press the right bearing until it stops at the pipe.
●Check that the spacer pipe does not have any axial play between the bearings.

**CAUTION**

○**Since the left bearing may slide out a little during removal, be sure to seat the bearing in the housing following the above procedure. This prevents the axle locknuts from loosening.**

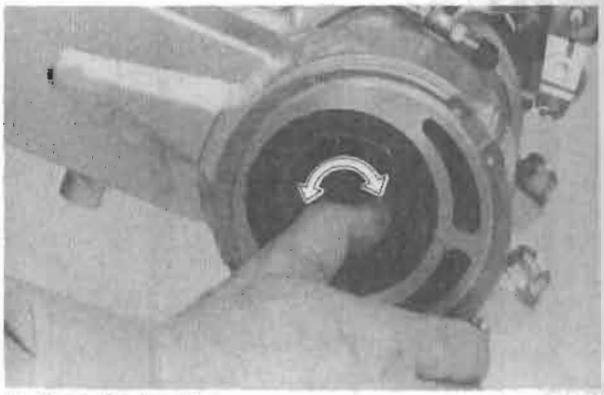
### *Rear Axle Bearing Inspection*

●Remove the rear axle (see Rear Axle Removal).

**NOTE**

○*Since the bearings are packed with grease and sealed they can not be lubricated.*

●Turn each bearing back and forth while checking for roughness or binding.
★If roughness or binding is found, replace the bearing.
●Examine the bearing seal for tears or leakage.
★If the seal is torn or is leaking, replace the bearing.



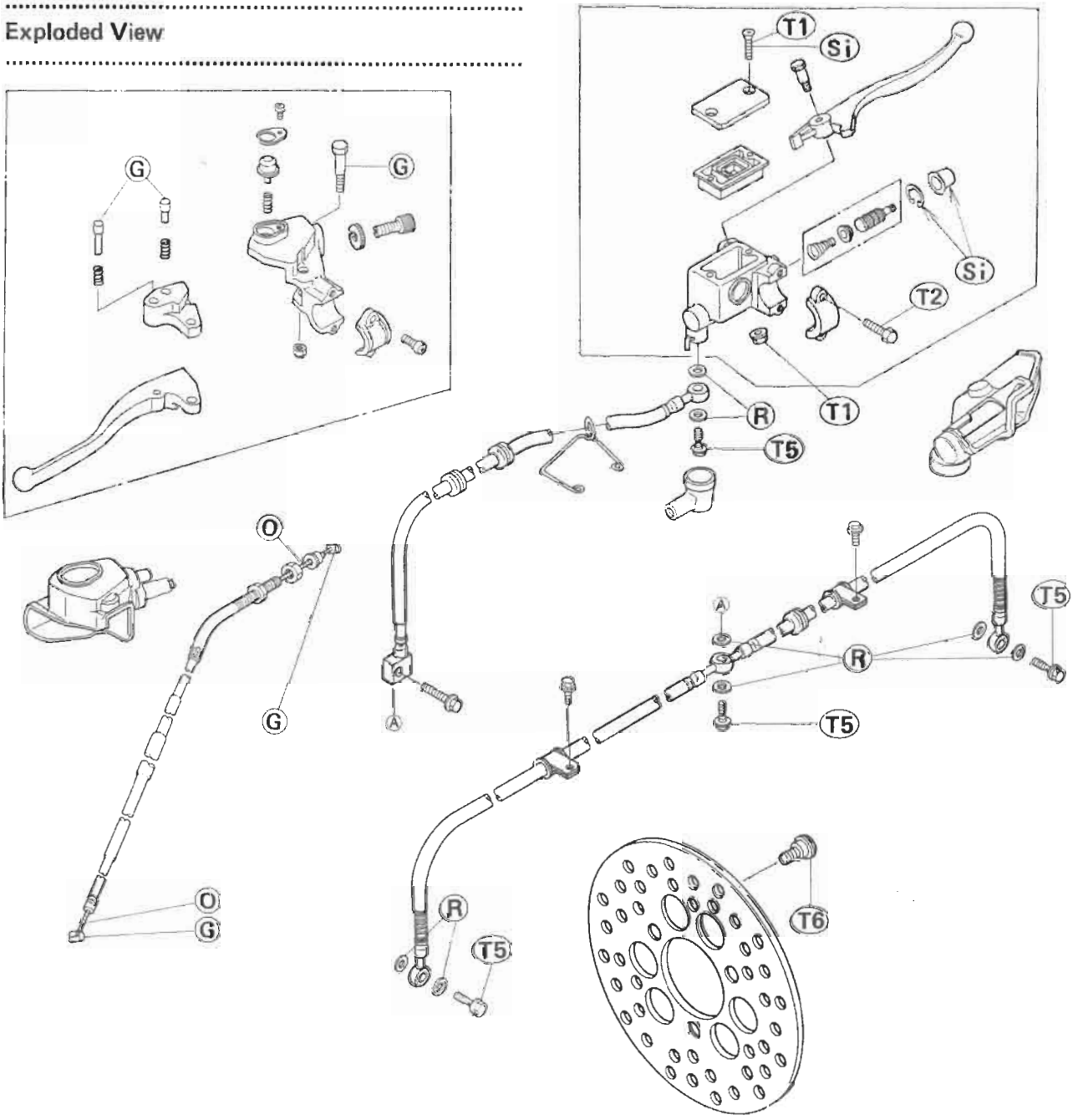
A. Turn the bearing.

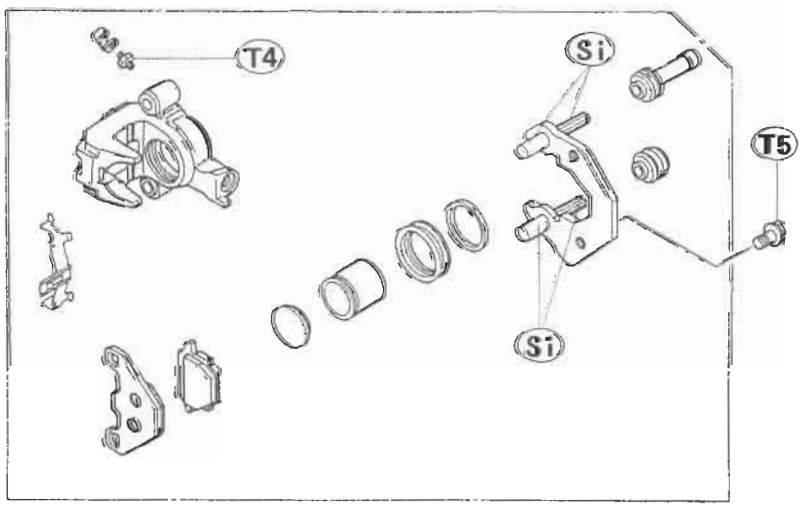
# Brakes

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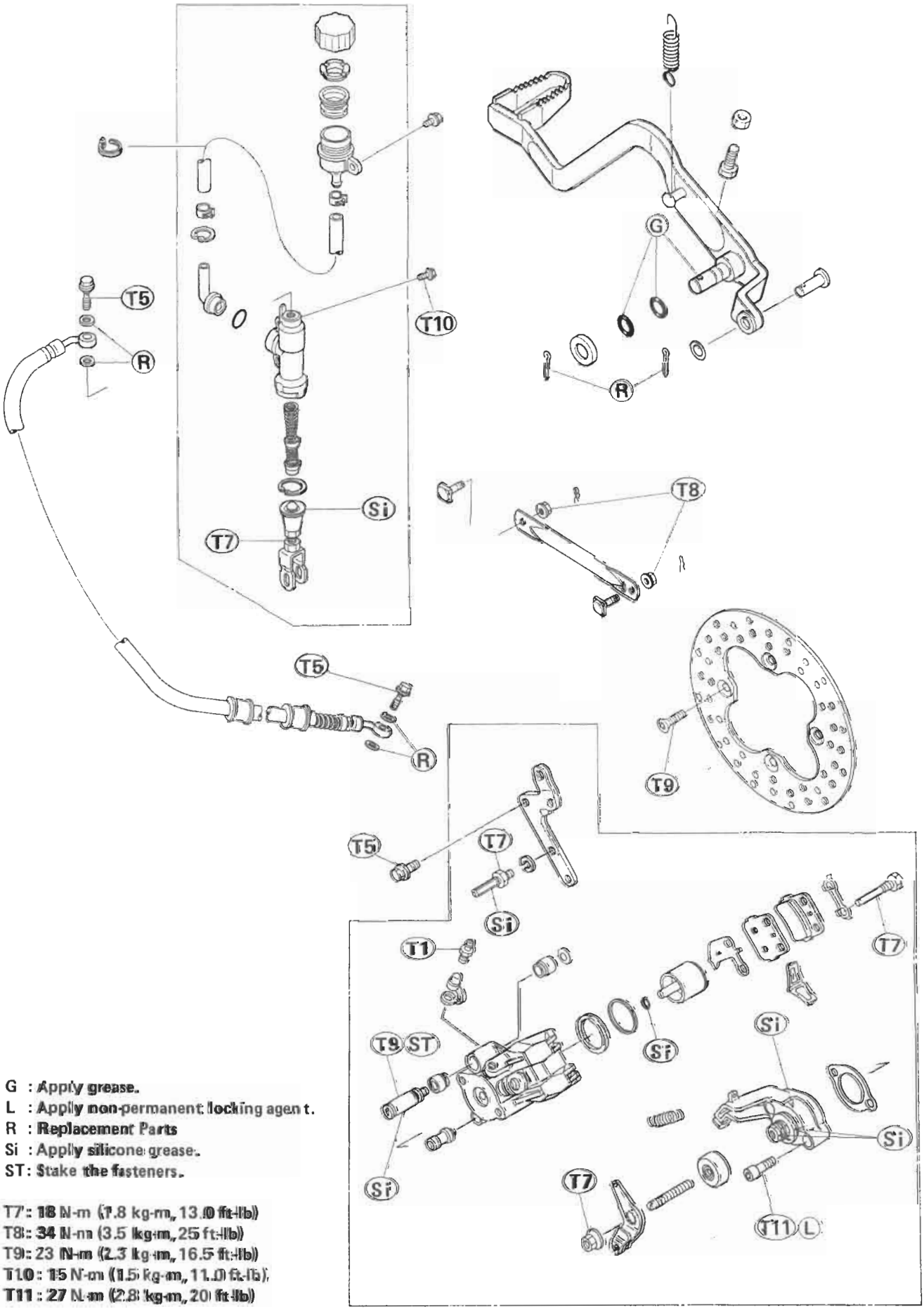
## Exploded View




G : Apply grease.
O : Apply oil.
R : Replacement Parts
Si : Apply silicon grease.

T1: 5.9 N-m (0.6 kg-m, 52 in-lb)
T2: 8.8 N-m (0.9 kg-m, 78 in-lb)
T3: 29 N-m (3.0 kg-m, 22 ft-lb)
T4: 7.8 N-m (0.8 kg-m, 69 in-lb)
T5: 25 N-m (2.5 kg-m, 18.0 ft-lb)
T6: 36 N-m (3.7 kg-m, 27 ft-lb)




G : Apply grease.
L : Apply non-permanent locking agent.
R : Replacement Parts
Si : Apply silicone grease.
ST : Stake the fasteners.

T7 : 18 N·m (1.8 kg-m, 13.0 ft-lb)
T8 : 34 N·m (3.5 kg-m, 25 ft-lb)
T9 : 23 N·m (2.3 kg-m, 16.5 ft-lb)
T10 : 15 N·m (1.5 kg-m, 11.0 ft-lb)
T11 : 27 N·m (2.8 kg-m, 20 ft-lb)

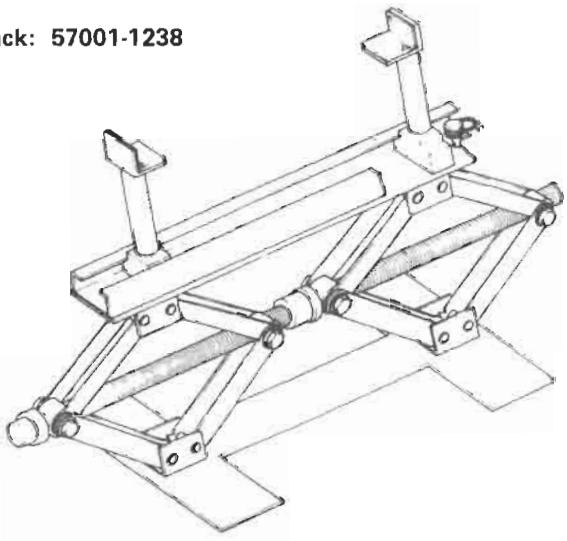
## Specifications

| Item | Standard | Service Limit |
|---|---|---|
| Brake Fluid Type | D.O.T.3 | |
| Front Disc Brake: | | |
| Front brake lever free play | Non-adjustable | – – – |
| Pad lining thickness | 4.5 mm | 1 mm |
| Disc thickness | 3.3 – 3.7 mm | 3 mm |
| Disc runout | 0.2 mm or under | 0.3 mm |
| Rear Disc Brake: | | |
| Parking lever free play | in the text | |
| Brake pedal position | in the text | – – – |
| Brake pedal free play | Non-adjustable | 3.5 mm |
| Pad lining thickness | 4.5 mm | 1 mm |
| Disc thickness | 3.8 – 4.2 mm | 3.5 mm |
| Disc runout | 0.2 mm or under | 0.3 mm |

**Brake Fluid Brand**

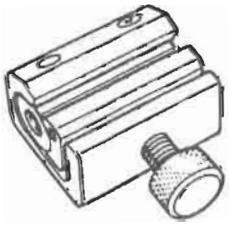
**Atlas Extra Heavy Duty**
**Shell Super Heavy Duty**
**Texaco Super Heavy Duty**
**Wagner Lockheed Heavy Duty**
**Castrol Girling – Universal**
**Castrol GT (LMA)**
**Castrol Disc Brake Fluid**

**Jack: 57001-1238**

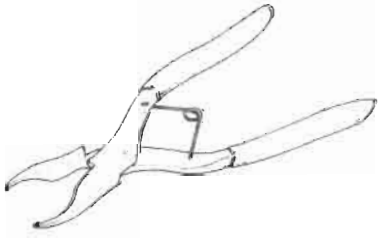


## Special Tools

**Pressure Cable Luber: K56019-021**



**Circlip Pliers: 57001-143**



## Brake Fluid

### *Brake Fluid Recommendation*

Recommended fluids are given in the table below. If none of the recommended brake fluids are available, use extra heavy-duty brake fluid only from a sealed container marked D.O.T.3.

**Recommended Brake Fluid**

| | |
|---|---|
| Type | D.O.T.3. |
| Brand | Atlas Extra Heavy Duty |
| | Shell Super Heavy Duty |
| | Texaco Super Heavy Duty |
| | Wagner Lockheed Heavy Duty |
| | Castrol Girling-Universal |
| | Castrol GT (LMA) |
| | Castrol Disc Brake Fluid |

**WARNING**

○Never reuse old brake fluid.
○Do not use fluid from a container that has been left unsealed or that has been open for a long time.
○Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
○Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
○Don't add or change the fluid in the rain or when a strong wind is blowing.
○If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE.

**CAUTION**

○Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

### *Brake Fluid Level Inspection*

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front and rear brake fluid reservoirs.

•Check the brake fluid level in the reservoirs.

**NOTE**

○*Hold the reservoir horizontal when checking brake fluid level (handlebar turned so that the reservoir is level).*

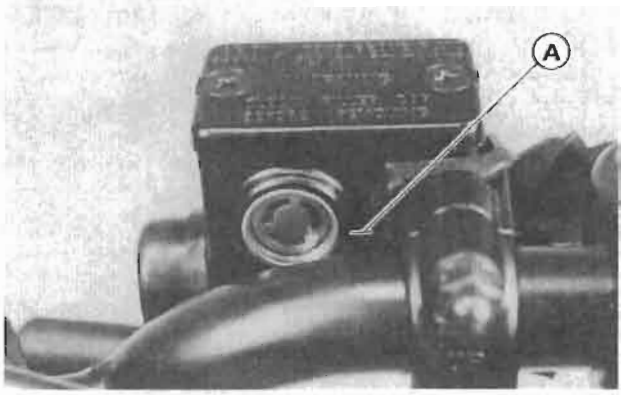
○The front and rear reservoirs must be kept more than half-full of brake fluid.

★If the fluid level is lower than the half-full line, fill the reservoir more than the half-full line with the same type and brand of fluid that already is in the reservoir.

**WARNING**

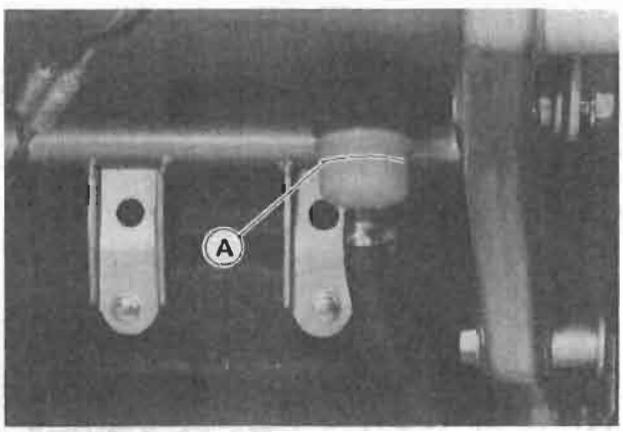
○Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that already is in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brands of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.

**Front Brake Fluid Reservoir**




A. Half-Full Line

**Rear Brake Fluid Reservoir**




A. Half-Full

•Apply the brake forcefully for a few seconds, and check for fluid leakage around the fittings.

**WARNING**

○**If the brake lever or pedal has a soft or "spongy feeling" when it is applied, there might be air in the brake line or the brake may be defective. Since it is dangerous to operate the vehicle under such conditions, bleed the air from the brake line immediately.**

### *Brake Fluid Changing*

In accordance with the Periodic Maintenance Chart, change the brake fluid. The brake fluid should also be changed if it becomes contaminated with dirt or water.

•Remove the reservoir cap, and remove the rubber cap on the bleed valve on the caliper.

•Attach a clear plastic hose to the bleed valve, and run the other end of the hose into a container.

•Open the bleed valve (counterclockwise to open), and pump the brake lever or pedal until all the fluid is drained from the line.

•Close the bleed valve.

○Since two disc brakes are used on the front, repeat the above 4 steps one more time for the other side.

•Fill the reservoir with fresh brake fluid.

•Open the bleed valve, apply the brake with the brake lever or pedal, close the valve with the brake held applied, and then quickly release the lever or pedal. Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose.

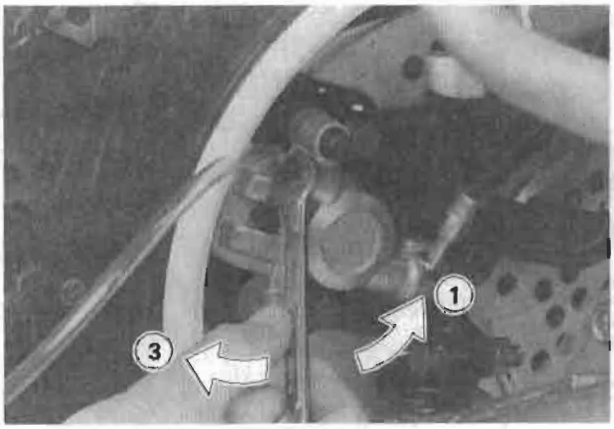
**NOTE**

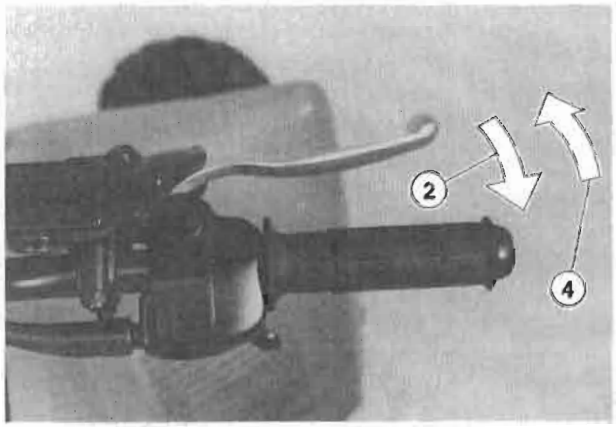
○*Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.*

○Repeat the above 2 steps one more time for the other front disc brake.

•Bleed the air from the lines (continue with Bleeding the Brake).

**Filling up the Brake Line**




1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve.
4. Then release the brake suddenly.

### *Brake Line Air Bleeding*

Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

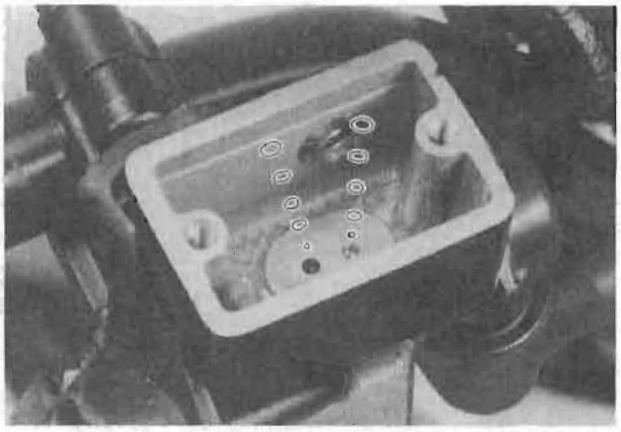
•Remove the reservoir cap, and check that there is plenty of fluid in the reservoir.

**NOTE**

○*The fluid level must be checked several times during the bleeding operation and replenished as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

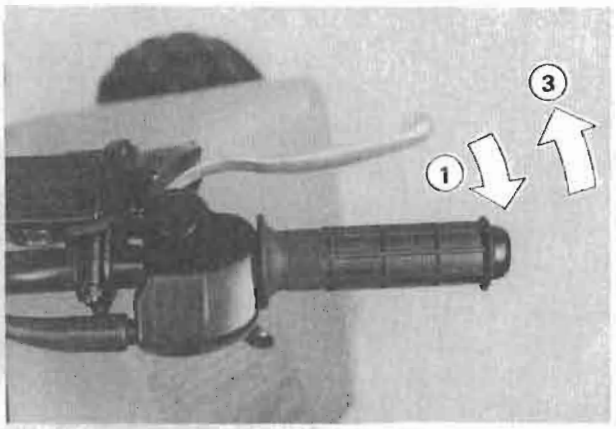
•Connect a clear plastic hose to the bleed valve(s) at the caliper(s), running the other end of the hose into a container.

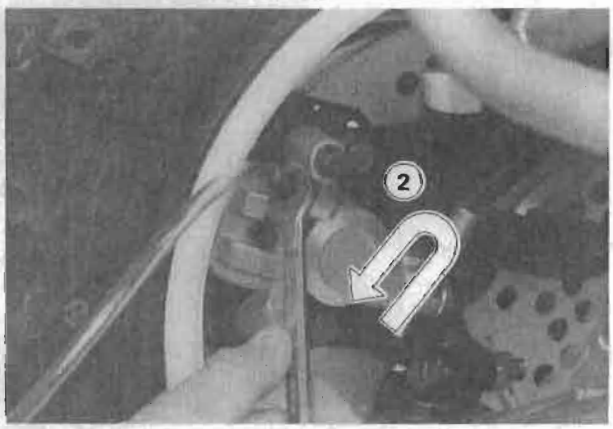
•With the reservoir cap off, slowly pump the brake lever or pedal several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.



- Bleed the air from the brake line, using the bleed valves on the brake calipers.
- Repeat the previous step one more time for the other front disc brake.
- When air bleeding is finished, install the rubber caps on the bleed valves, and check that the brake fluid is more than the half-full line of each reservoir (handlebar turned so that the reservoir is level).

**Bleeding the brake line**




1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.

## Brake Adjustment

### *Front Brake Adjustment*

Disc and pad wears are automatically compensated for and have no effect on brake lever action. There are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling," check the brake fluid level in the reservoir and bleed the air from the brake line (see Brake Line Air Bleeding).

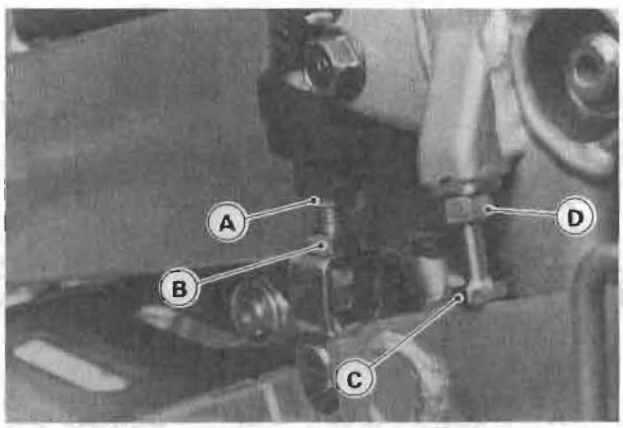
**NOTE**

*Check the brake fluid level in accordance with the Periodic Maintenance Chart.*

### *Rear Brake Pedal Position Adjustment*

Adjust the brake pedal position to suit you as follows.

- Loosen the stopper locknut and turn in the stopper all the way.



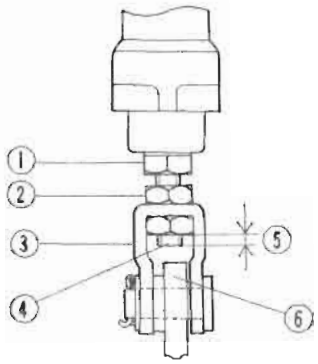

A. Hex Head
B. Push Rod Locknut
C. Stopper
D. Stopper Locknut

- Loosen the locknut on the master cylinder push rod and turn the push rod with the hex head to achieve correct pedal position.
- When the brake pedal position is correct, tighten the push rod locknut against the clevis to the specified torque (see Exploded View).

**WARNING**

○**Do not adjust the push rod so that its lower end in the clevis is invisible. If the rod falls out of the clevis, the brake will not work. Always keep the end projection more than 1 mm from the nut in the clevis, but it should not touch the brake pedal lever end when the brake is applied.**

**Brake Pedal Position Adjustment**




1. Hex Head
2. Locknut
3. Clevis
4. Push Rod Lower End
5. End Projection
6. Brake Pedal Lever End

●Turn out the stopper until it touches the brake pedal lever and then tighten the stopper locknut.

### *Parking Brake Adjustment*

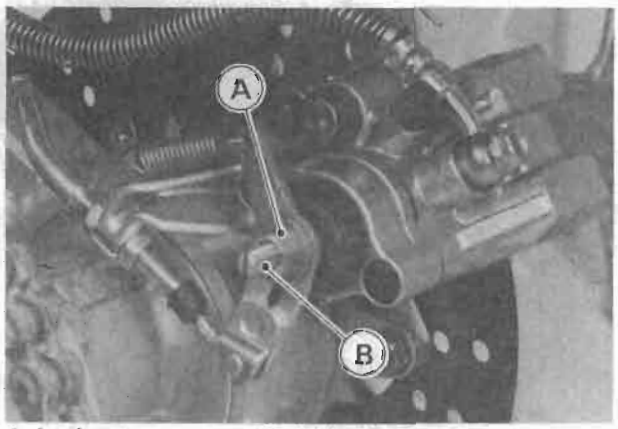
In accordance with the Periodic Maintenance Chart, adjust the parking brake cable.

●First loosen the locknut on the cam lever and turn in the adjusting screw as far as it will go.

●Turn out the adjusting screw ½ to ⅔ turn and tighten the locknut lightly.

●Loosen the locknuts at the rear caliper bracket to give the cable plenty of play.

●Again loosen the locknut on the cam lever and turn in the adjusting screw as far as it will go.

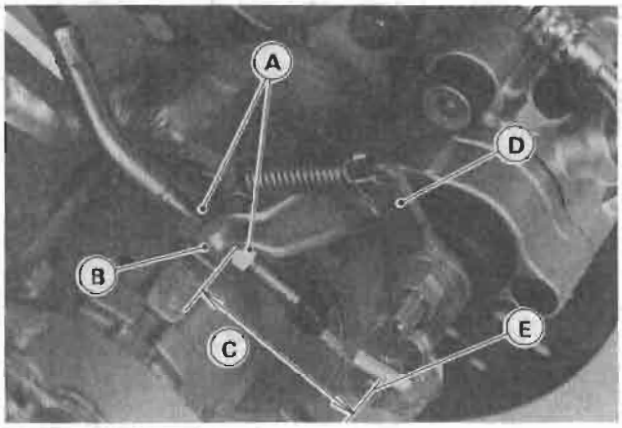



A. Locknut B. Adjusting Screw

●Turn out the adjusting screw ¼ turn.

●Tighten the locknut securely.

●Turn both nuts at the bracket so that the length from the rear end of the bracket to the center of the cable tip is **42 – 44 mm** as shown.




A. Nuts
B. Bracket
C. 42 – 44 mm
D. Cam Lever
E. Cable Tip

**NOTE**

○*When measuring the length, pull the lower end of the cam lever rearward to take up cable looseness.*

●Tighten both nuts securely against the bracket.

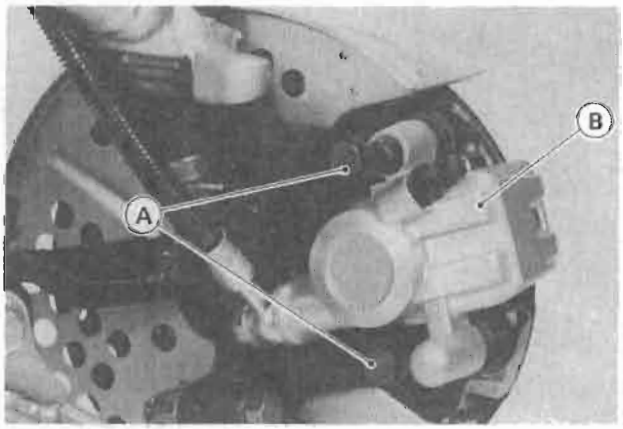
## Calipers

### *Front Caliper Removal*

●Remove the front wheels (see Wheel Removal in Wheels/Tires chapter).

●Separate the brake hose from the caliper by taking off the banjo bolt.

●Remove the caliper mounting bolts, and take off the calipers.

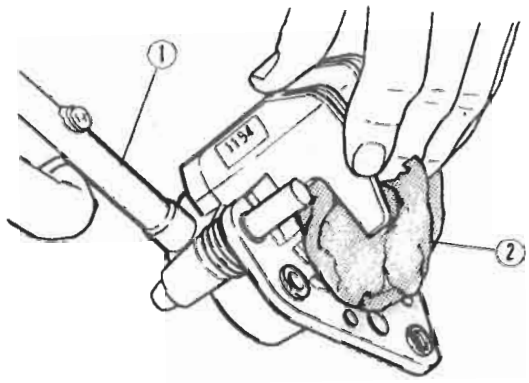



A. Mounting Bolts B. Caliper

●If the caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following procedure. If both calipers are to be disassembled, be sure to do this procedure to both at the same time.
○Remove the pads.
○Temporarily reconnect the brake hose to the caliper. The banjo bolt need not be torqued.
○Pump the brake lever to remove the caliper piston.
○Immediately wipe up any brake fluid that spills.
○Disconnect the brake hose from the caliper.

**WARNING**

○**To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.**



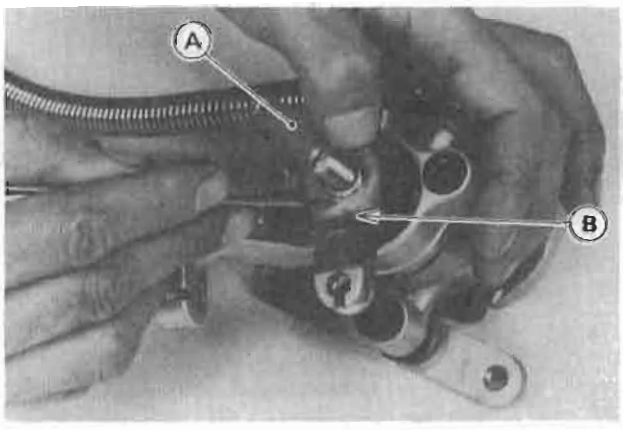

1. Apply compressed air. 2. Cloth

### *Rear Caliper Removal*

●Remove the following parts.
Brake Hose Banjo Bolt on the Caliper
Torque Link Nut and Bolt on the Caliper
Caliper Mounting Bolts
Return Spring for Parking Brake
Parking Brake Cable Lower End
●Remove the rear caliper.

### *Rear Caliper Disassembly*

●Remove the rear caliper.
●Remove the locknut on the rear caliper brake cam lever.
●Before removing the brake cam lever, mark the cam lever so that it can be installed later in the same position. Lever so that it can be installed later in the same position.




A. Brake Carn Lever B. Mark

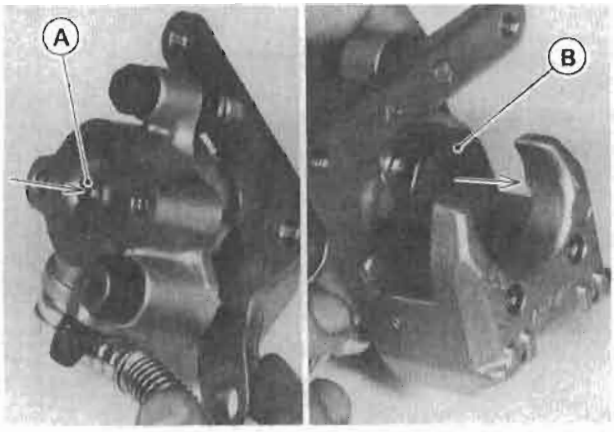
●Remove the cam lever.
●Remove the Allen bolts holding the parking brake assembly.
●Tap the piston out.

### *Caliper Installation Notes*

●Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting.
●Check the fluid level in the reservoir, and bleed the brake line (see Bleeding the Brake Line).
●Install the rear caliper as follows.
○Install the rear caliper return spring noting the hook direction (see Parking Brake Cable Installation Notes) to prevent it's missing.
○Adjust the parking brake (see Parking Brake Adjustment).
●Check the brakes for good braking power, no brake drag, and no fluid leakage.

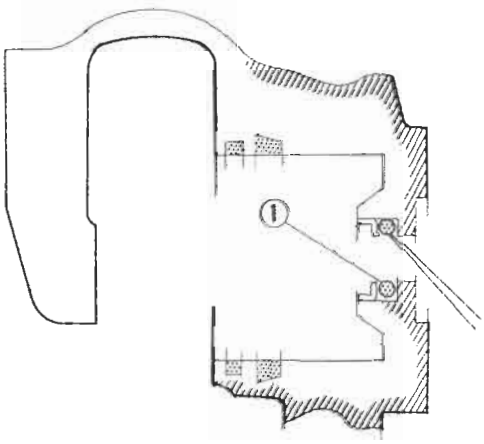
### *Front Caliper Disassembly Notes*

●Using compressed air, remove the piston.
○Cover the caliper opening with a clean, heavy cloth.
○Remove the piston by lightly applying compressed air to where the brake line fits into the caliper.




A. Piston Rod B. Piston

★If the piston rod O-ring is damaged, remove the O-ring using a suitable hook, and replace the O-ring with a new one.



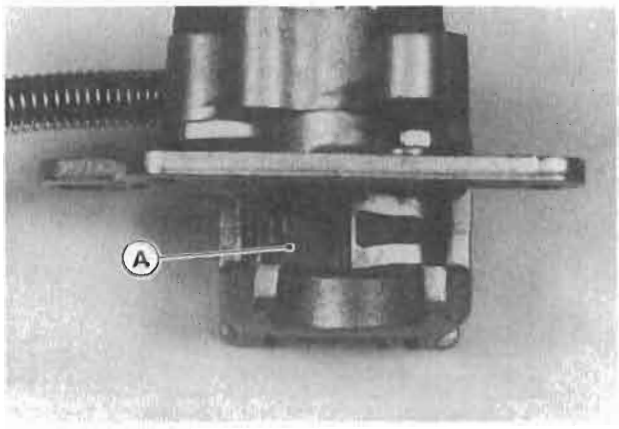

1. Piston Rod O-Ring

*Caliper Assembly Notes*

**WARNING**

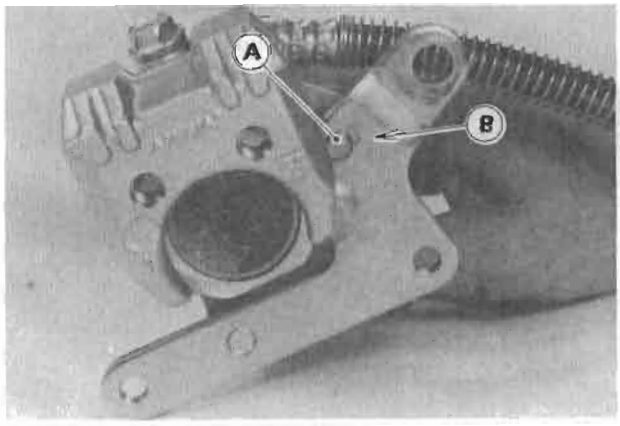
**○Except for the disc pads and discs; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.**

●Apply brake fluid to the outside of the piston and piston rod, and the fluid seal, then push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt gets scratched.
●Install the dust seal around the front caliper piston. Check that the dust seal is properly fitted into the grooves in the piston and caliper.
●Apply a thin coat of silicone grease to the caliper holder shafts and holder holes. (Silicone grease is a special high temperature, water-resistant grease).
●Install the anti-rattle spring in the calipers as shown.



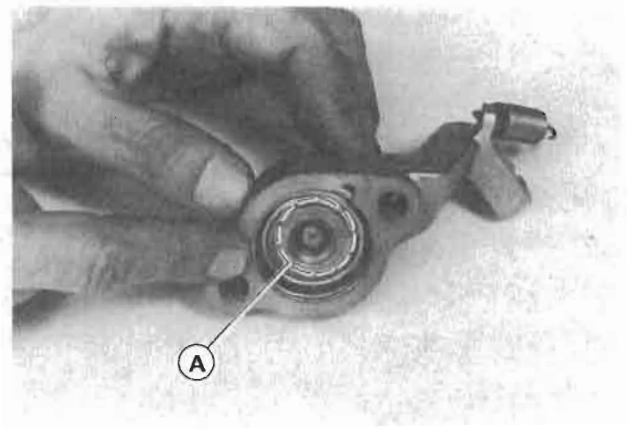

A. Anti-Rattle Spring

●Assemble the rear caliper using the additional information below.
○Tighten the caliper holder shafts to the specified torque (see Exploded View).
○Stake the end of the caliper holder shaft against the caliper holder.



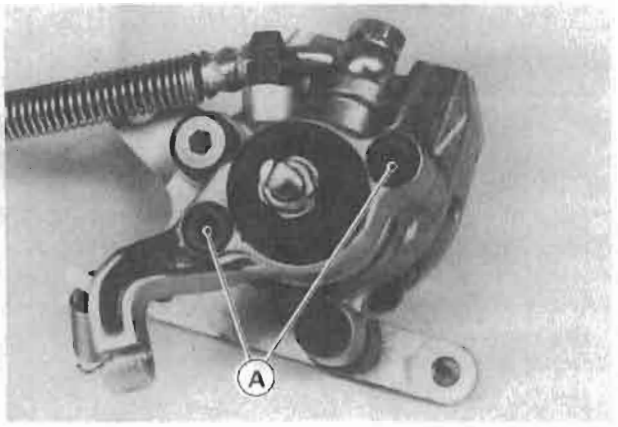

A. Caliper Holder Shaft B. Stake here.

○Pack the inside of the parking brake body with silicone grease.



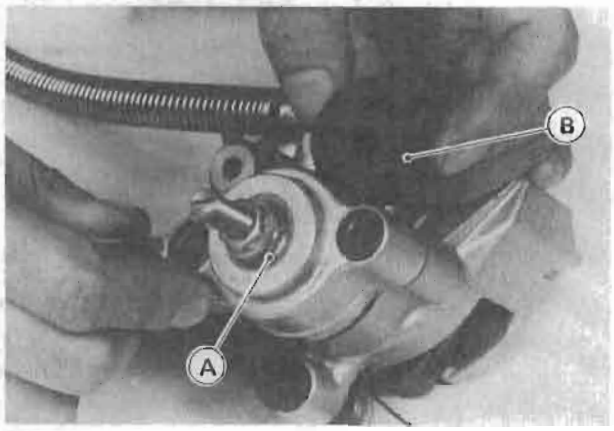

A. Grease here.

○Install the new gasket and the parking brake body.
○Apply a non-permanent locking agent to the threads of the Allen bolts and tighten them to the specified torque (see Exploded View).




A. Allen Bolts

○After applying silicone grease to the boot lip and the parking brake shaft, install the boot over the shaft.




A. Parking Brake Shaft B. Boot

○Make sure that the boot fits into the grooves on the shaft and on the body.
○Install the brake cam lever in the original position on the shaft. (The mark made during disassembly).
○Install the adjusting screw and locknut, then adjust them (see Parking Brake Adjustment).

### *Caliper Fluid Seal Damage*

The fluid seal around the piston maintains the proper pad/disc clearance. If this seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

●Replace the fluid seals under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in inner and outer pad wear; (d) the seal is stuck to the piston. If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

### *Caliper Dust Seal and Cover Damage*

●Check that the dust seals and covers are not cracked worn, swollen, or otherwise damaged.
★If they show any damage, replace them.

### *Caliper Piston and Cylinder Damage*

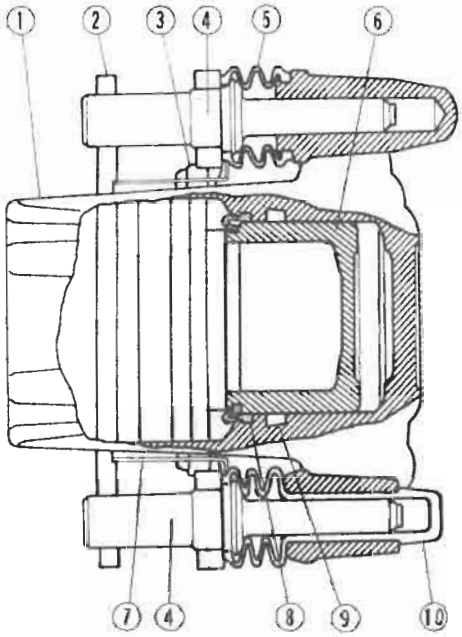
●Visually inspect the piston and cylinder surfaces.
★Replace the caliper if the cylinder and piston are badly scored or rusty.

### *Caliper Holder Shaft Wear*

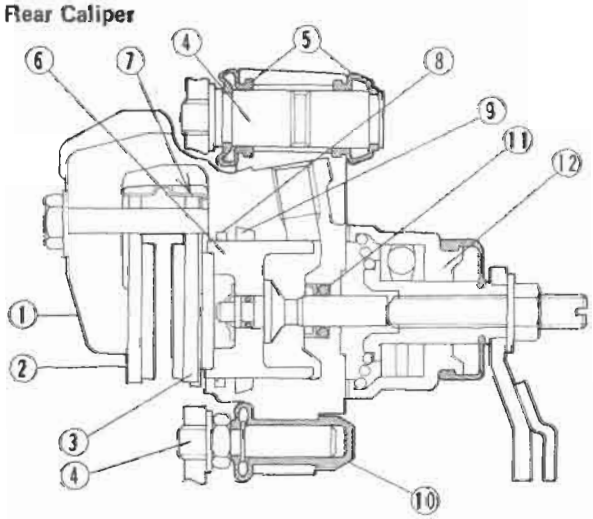
The caliper body must slide smoothly on the caliper holder shafts. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

●Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber friction boots are not damaged.
★If the rubber friction boot is damaged, replace the rubber friction boot.
★If the caliper shaft is damaged, replace the caliper assembly for the front caliper, and replace the caliper holder shaft and rubber friction boot as a unit for the rear caliper.

**Front Caliper**



**Rear Caliper**



1. Caliper
2. Brake Pad
3. Brake Pad
4. Caliper Holder Shafts
5. Dust Cover
6. Piston
7. Antirattle Spring
8. Dust Seal
9. Fluid Seal
10. Friction Boot
11. Piston Rod O-Ring
12. Brake Cam Assembly

### *Rear Caliper Inspection*

Inspect the rear caliper in the same manner as the front calipers. Note the additional information below.

★If the fluid leakage is noted around the pad, check the piston rod O-ring as well as the fluid seals.

●Replace the damaged O-ring.

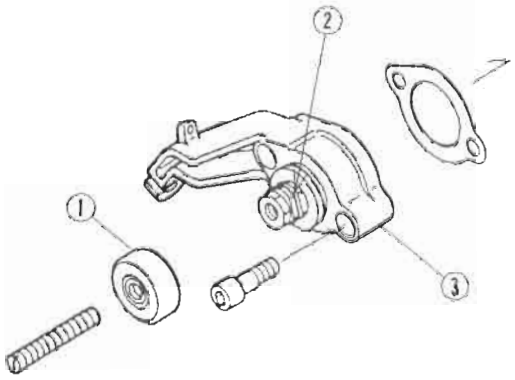
●Visually inspect the boot.

★Replace the boot if it is cracked, swollen or otherwise damaged.

●Visually inspect the parking brake shaft.

★Replace the brake cam assembly if the shaft is worn, stepped or otherwise damaged.

**Rear Caliper Inspection**



1. Boot
2. Parking Brake Shaft
3. Brake Cam Assembly

## Brake Pads

**WARNING**

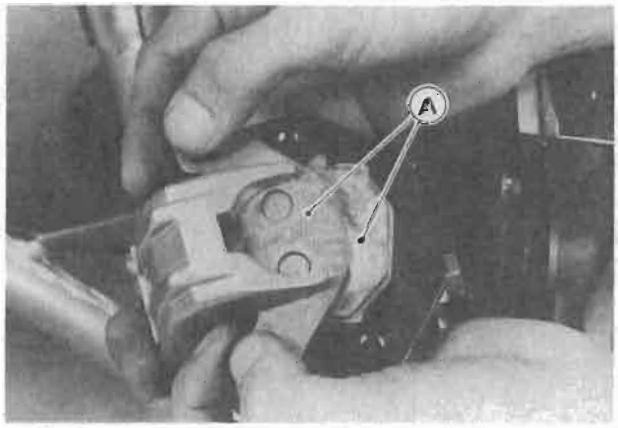
**When handling the disc pads, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads with a high-flash point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.**

### *Front Brake Pad Removal*

●Remove the front wheel (see Wheel Removal in Wheels/Tires chapter).

●Lift off the caliper by taking off the mounting bolts.

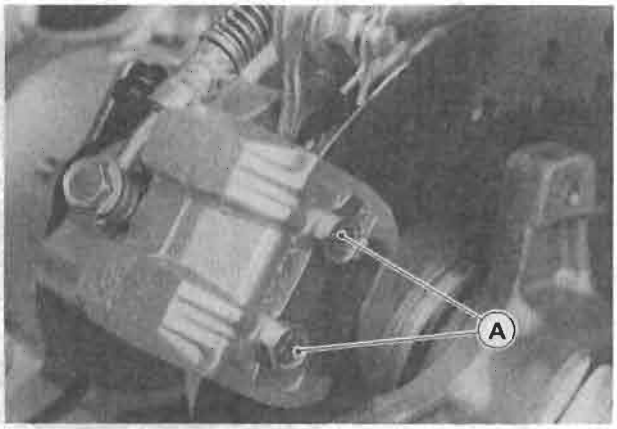
●Push the caliper holder toward the piston side, and then remove the pads.



A. Pads

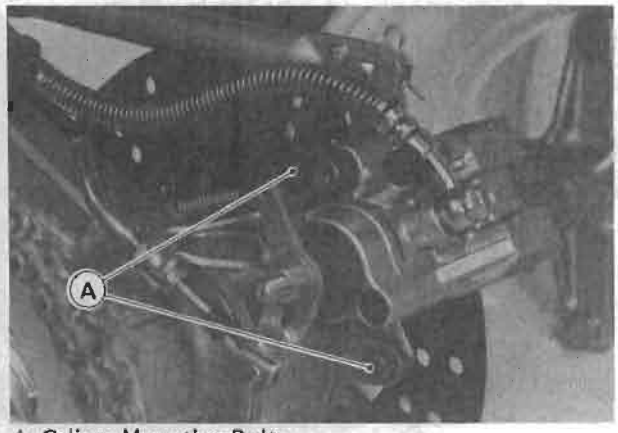
### *Rear Brake Pad Removal*

•After bending the lockwasher tabs up, loosen the pad mounting bolts.



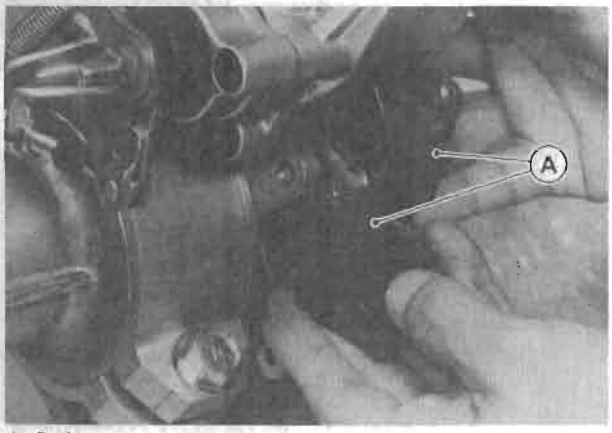

A. Pad Mounting Bolts

•Loosen the torque link nuts after removing the safety clips.
•Remove the caliper mounting bolts.
•Take the caliper off the disc with the brake hose, the brake cable and the torque link left installed.




A. Caliper Mounting Bolts

•Remove the pad mounting bolts.
•Take out the pads.




A. Pads

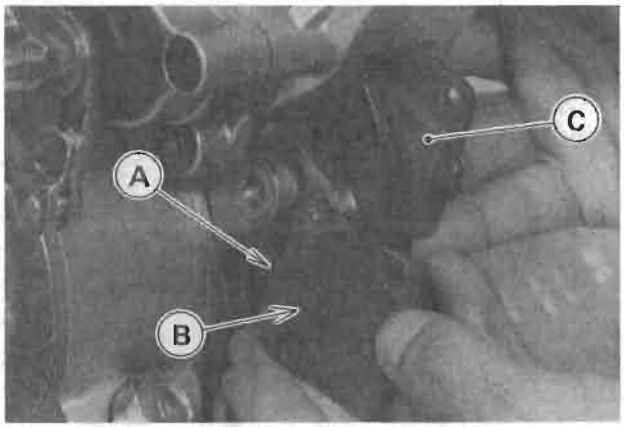
### *Brake Pad Installation Notes*

•Push the caliper piston in by hand as far as it will go to allow clearance for the pads.

**WARNING**

○**Do not attempt to drive the vehicle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against each disc. The brake will not function on the first application if this is not done.**

•Install the rear caliper pads using the additional information below.
○The inboard pad next to the piston has a wear protecting shim. Be careful not to mix it up with the outboard pad.




A. Inboard Pad
B. Shim
C. Outboard Pad

○Tighten the following parts to the specified torque (see Exploded View).
Pad Mounting Bolts
Caliper Mounting Bolts
Torque Link Nuts
○If necessary, adjust the parking brake (see Parking Brake Adjustment).

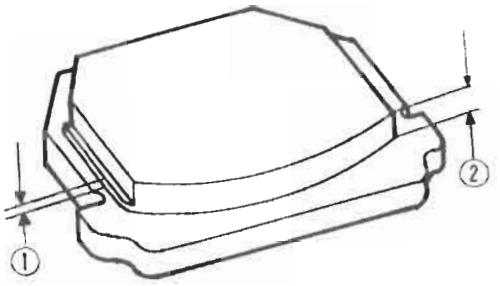
### *Brake Pad Wear Inspection*

In accordance with the Periodic Maintenance Chart, inspect the brake pads for wear.
•Remove the front wheels in order to check the front brake pads.
•Check the lining thickness of the pads in each caliper. The pad thickness can be checked with the pad installed.
★If the lining thickness of either pad is less than the service limit, replace both pads in the caliper as a set.

**Pad Lining Thickness**

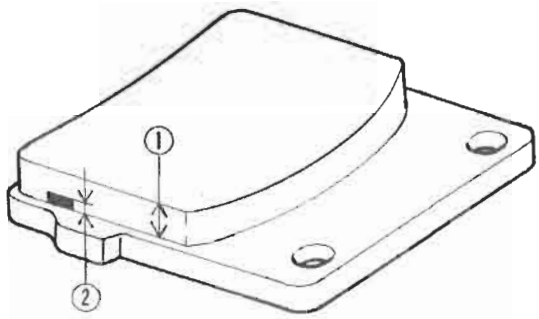
| | |
|---|---|
| **Standard:** | **4.5 mm (front and rear)** |
| **Service Limit:** | **1 mm** |

**Front Brake Pad**




1. Service Limit 2. Lining Thickness

**Rear Brake Pad**

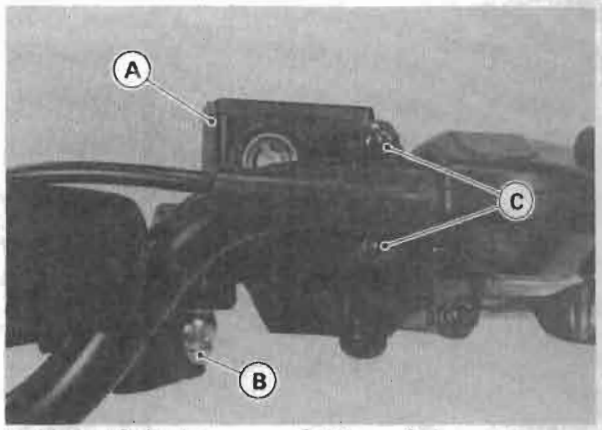



1. Lining Thickness 2. Service Limit

## Master Cylinder

### *Front Master Cylinder Removal*

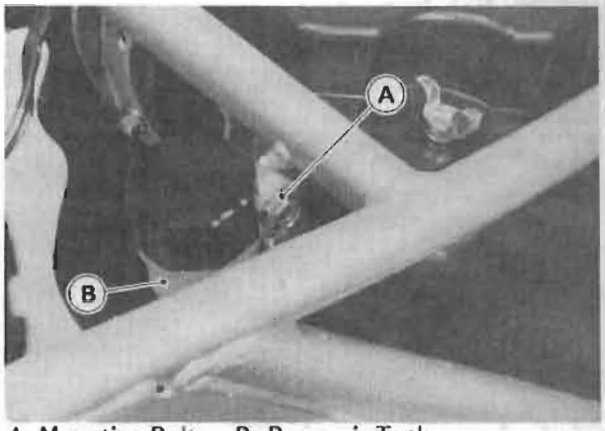
- Pull back the dust cover, and remove the banjo bolt to disconnect the upper brake hose from the master cylinder. There is a flat washer on each side of the hose fitting.
- Remove the clamp bolts and take off the master cylinder. Immediately wipe up any brake fluid that spills.




A. Master Cylinder C. Clamp Bolts
B. Banjo Bolt

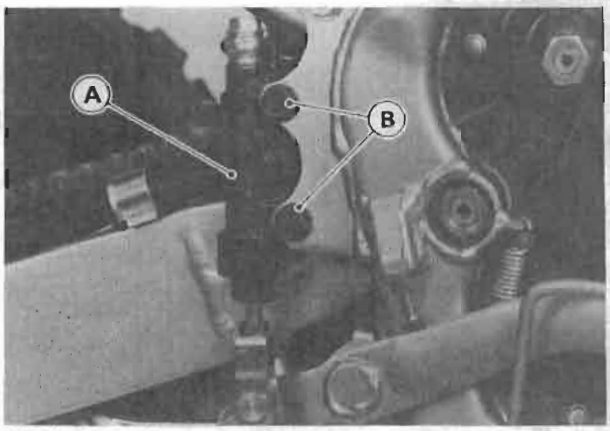
### *Rear Master Cylinder Removal*

- Remove the reservoir tank by taking out the mounting bolt.




A. Mounting Bolt B. Reservoir Tank

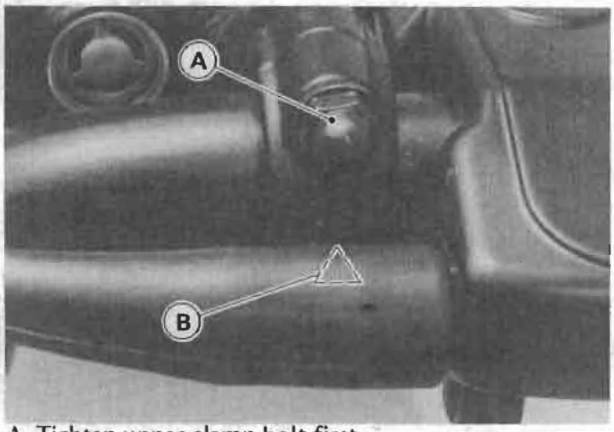
- Remove the reservoir tank cap, and empty out the brake fluid.
- Remove the banjo bolt connected to the rear caliper.
- Separate the master cylinder from the brake pedal by removing the pedal pin joint.
- Remove the master cylinder by taking out the mounting bolts.




A. Master Cylinder B. Mounting Bolts

### *Front Master Cylinder Installation Notes*

- The master cylinder clamp must be installed with the arrow mark upward.
- Tighten the upper clamp bolt first, and then the lower clamp bolt to the specified torque (see Exploded View). There will be a gap at the lower part of the clamp after tightening.




A. Tighten upper clamp bolt first.
B. Arrow Mark

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque (see Exploded View).

### *Rear Master Cylinder Installation Notes*

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque.
- Run the brake hose according to the Cable and Harness Routing section in the General Information chapter.

### *Master Cylinder Inspection after Installation*

- Bleed the brake line after master cylinder installation.
- Check the brake for good braking power, no brake drag, and no fluid leakage.

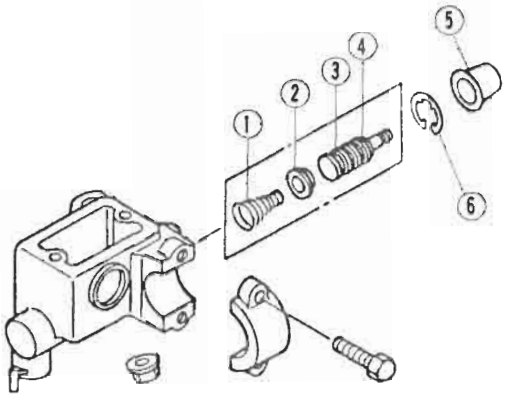
### *Front Master Cylinder Disassembly Notes*

- Remove the front master cylinder from the handlebar.
- Remove the master cylinder cap and diaphragm, and empty out the brake fluid.
- Remove the locknut and pivot bolt, and remove the brake lever.
- Slide out the dust seal.
- Remove the stopper with circlip pliers.
- Remove the piston with the secondary cup, primary cup and spring.

**NOTE**

○Do not remove the secondary cup from the piston since removal will damage it.

**Front Master Cylinder**




1. Spring
2. Primary Cup
3. Piston
4. Secondary Cup
5. Dust Seal
6. Stopper

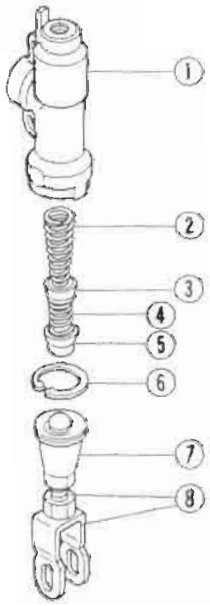
### *Rear Master Cylinder Disassembly Notes*

- Remove the rear master cylinder.
- Slide the dust seal out.
- Remove the stopper with circlip pliers and pull out the push rod and clevis.
- Then remove the piston along with the secondary cup, spring and primary cup.

**NOTE**

○*Do not remove the primary cup and the secondary cup from the piston since removal will damage them.*

**Rear Master Cylinder**




1. Master Cylinder
2. Spring
3. Primary Cup
4. Piston
5. Secondary Cup
6. Stopper
7. Dust Seal
8. Push Rod and Clevis

### *Front and Rear Master Cylinder Assembly Notes*

•Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

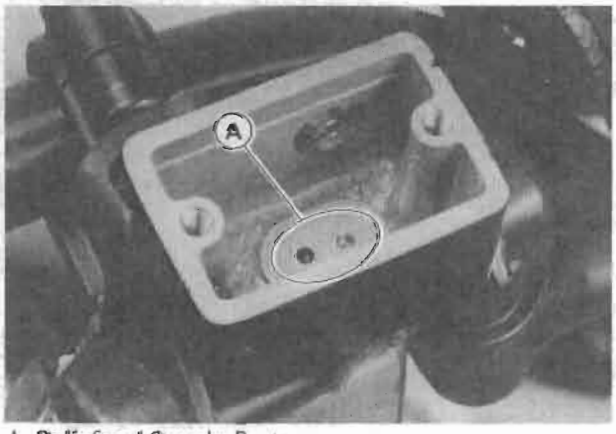
**WARNING**

○**Except for the disc pads and discs; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.**

•Take care not to scratch the piston or the inner wall of the cylinder.
•Apply brake fluid to the parts removed and to the inner wall of the cylinder.
•Apply silicone grease to the boot.
•When assembling the master cylinder parts, follow the above illustrations.

### *Master Cylinder Inspection (Visual Inspection)*

•Disassemble the front and rear master cylinders.
•Check that there are no scratches, rust or pitting on the inside of the master cylinder and on the outside of the piston.
★If the master cylinder or piston shows any damage, replace them.
•Inspect the primary cups and secondary cups.
★If a cup is worn, damaged, softened (rotted), or swollen, replace the piston assembly.
★If fluid leakage is noted, the piston assembly should be replaced.
•Check the dust covers for damage.
★If they are damaged, replace them.
•Check that the relief and supply ports are not plugged.
★If the small relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.
•Check the piston return springs for any damage.
★If the spring is damaged, replace the piston assembly.




A. Relief and Supply Ports

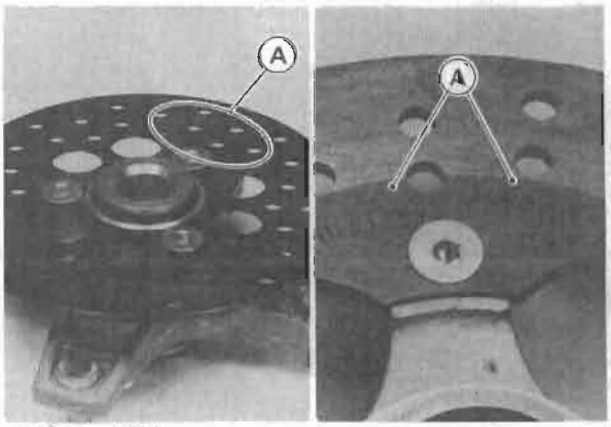
## Discs

**WARNING**

○**When handling the discs, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the discs with a high-flash point solvent. Do not use one which will leave an oily residue.**

### *Disc Installation Notes*

•Tighten the disc mounting Allen bolts to the specified torque. The disc must be installed with the chamfered hole side facing toward the front hub or the disc holder. The marked side should face outward.

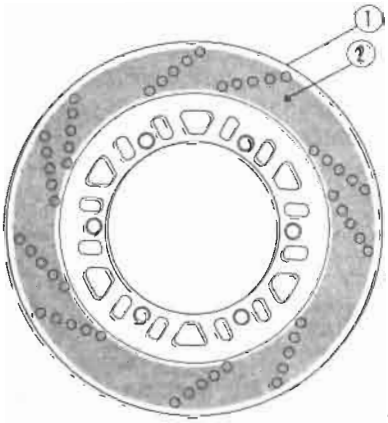



A. Marked Side

•After installing the discs, check the disc runout. Completely clean off any grease that has gotten on either side of the disc with a high-flash point solvent. Do not use one which will leave an oily residue.

### *Disc Wear*

•Measure the thickness of each disc at the point where it has worn the most.
★Replace the disc if it has worn past the service limit.




1. Brake Disc
2. Measuring Area

Front Disc Thickness

| | |
|---|---|
| Standard: | 3.3 – 3.7 mm |
| Service Limit: | 3.0 mm |

Rear Disc Thickness

| | |
|---|---|
| Standard: | 3.8 – 4.2 mm |
| Service Limit: | 3.5 mm |

### *Disc Cleaning*

Poor braking can be caused by oil on a disc. Oil on a disc must be cleaned off with an oilless cleaning fluid such as trichloroethylene or acetone.

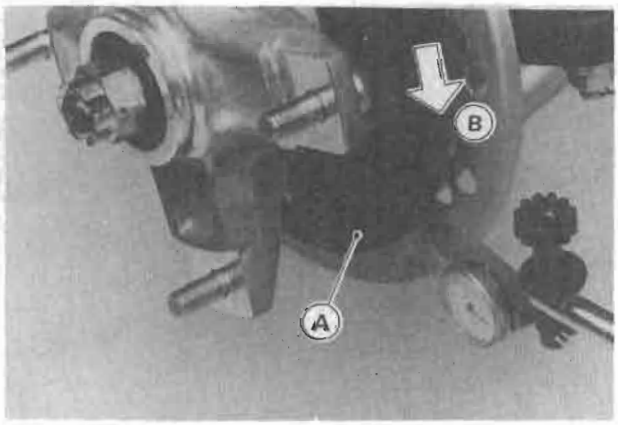
**WARNING**

**○These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.**

### *Disc Warp Inspection*

- Jack up the vehicle so that the wheels are off the ground.
- For front disc inspection, remove the front wheels, and turn the handlebar fully to one side.
- Set up a dial gauge against the disc as shown, and measure disc runout.

★If runout exceeds the service limit, replace the disc.




A. Brake Disc B. Turn the disc by hand.

Disc Runout (front and rear)

| | |
|---|---|
| Standard: | 0.2 mm or under |
| Service Limit: | 0.3 mm |

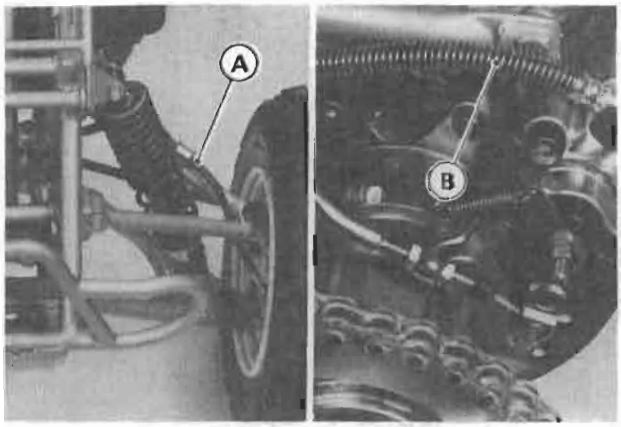
## Brake Hoses

### *Brake Hose Inspection*

The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained.

- Bend and twist the rubber hose while examining it.

★Replace it if any cracks or bulges are noted.




A. Front Brake Hose B. Rear Brake Hose

### *Brake Hose Replacement*

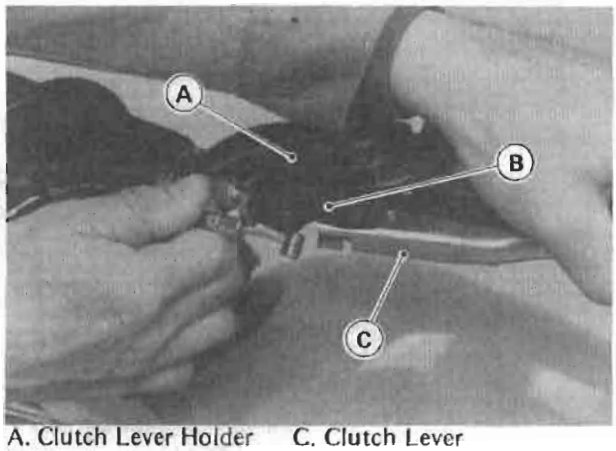
- Pump the brake fluid out of the line as explained in the Brake Fluid Changing.
- Remove the banjo bolt ends of the brake hose, and pull the hose off the vehicle.
- Install the new brake hose in its place, and tighten the banjo bolts to the specified torque, noting the following:

○Run the brake hose according to the Cable and Harness Routing section in the General Information chapter.
○Use a new flat washer for each side of the fittings.
○See Exploded View for torque specifications.

## Parking Brake Cable

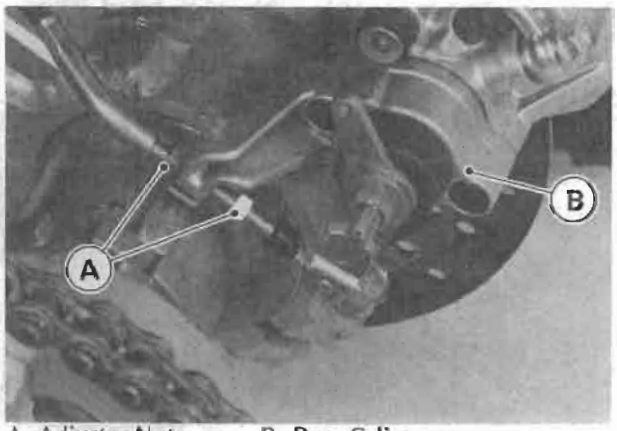
### *Parking Brake Cable Removal*

- While pulling the clutch lever, pull the brake outer cable out of the clutch lever holder, and free the tip of the inner cable from the parking brake lever.



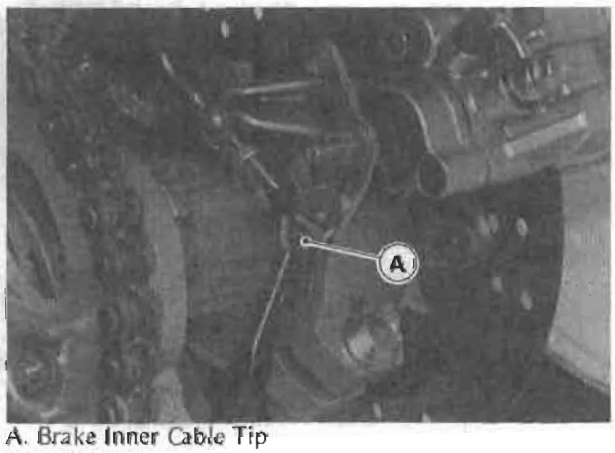

A. Clutch Lever Holder C. Clutch Lever
B. Parking Brake Lever

- Loosen the adjuster nuts at the caliper bracket, and slide the lower end of the parking brake cable to give the cable plenty of play.




A. Adjuster Nuts B. Rear Caliper

- Remove the return spring on the rear caliper.
- Slide the lower end of the brake cable to give the cable plenty of play.
- Free the inner cable tip from the cam lever.

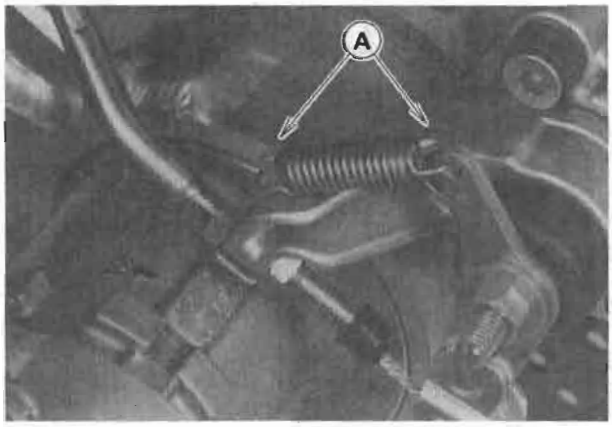



A. Brake Inner Cable Tip

- Pry off the hose clamps on the swing arm, pull the brake cable out of the vehicle.

### *Parking Brake Cable Installation Notes*

- Lubricate the brake cable before installation (see General Lubrication in Appendix chapter).
- Install the brake cable upper end in the parking brake lever.
- Run the brake cable according to the Cable and Harness Routing section in the General Information chapter.
- Install the brake cable lower end on the rear caliper.
- Install the return spring noting the hook direction.



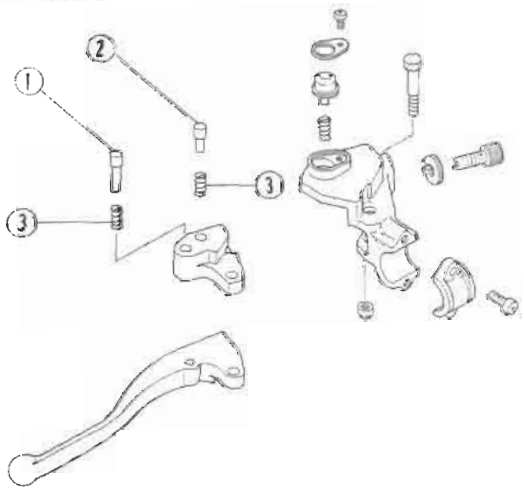

A. Hooks

- Adjust the parking brake (see Parking Brake Adjustment).

### *Parking Brake Lever Assembly Notes*

- Grease the parking brake lever pins.
- Install the shorter pin inboard, and the longer pin outboad with the springs in the parking brake lever.

**Parking Brake Lever Assembly**




1. Longer Pin
2. Shorter Pin
3. Springs

●Check that the clutch lever lock operates properly.

NOTE

○*Refer to the Owner's Manual for the function of the clutch lever lock.*

### *Parking Brake Cable Lubrication*

●Lubricate the parking brake cable in accordance with the Periodic Maintenance Chart (see General Lubrication in Appendix chapter).

○Use the pressure cable luber (special tool: PN 56019-021) to lubricate the cable.

### *Parking Brake Cable Inspection*

●With the brake cable disconnected at both ends, the cable should move freely in the cable housing (see General Lubrication in the Appendix chapter).

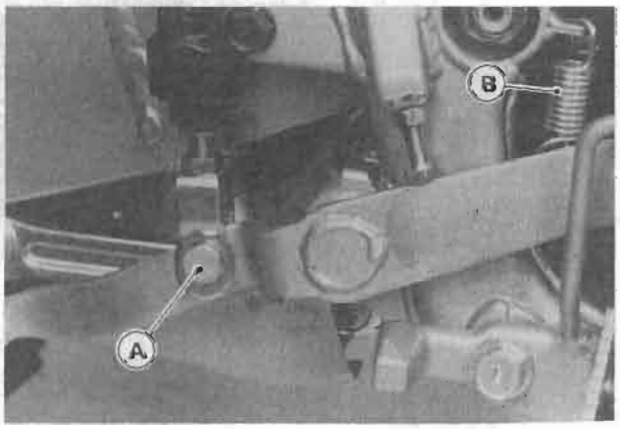
## Rear Brake Pedal

### *Rear Brake Pedal Removal*

●Loosen the stopper locknut and turn in the stopper all the way.

●Remove the return spring.

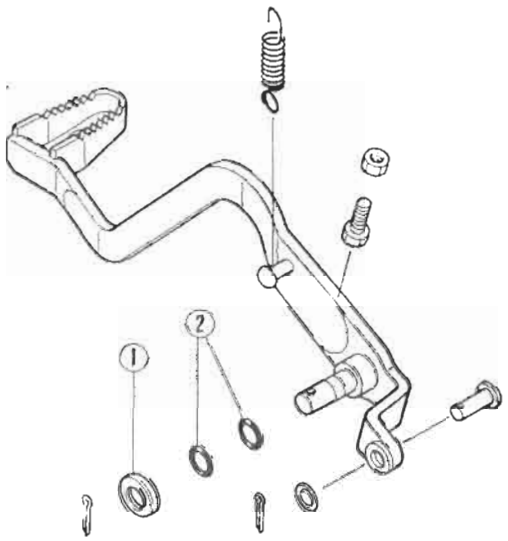
●Separate the brake pedal from the master cylinder by removing the pedal pin joint and cotter pin.




A. Pin Joint B. Return Spring

●Remove the brake shaft cap and cotter pin.

●Pull the brake pedal out. The O-rings come off with the brake pedal shaft.




1. Cap 2. O-Rings

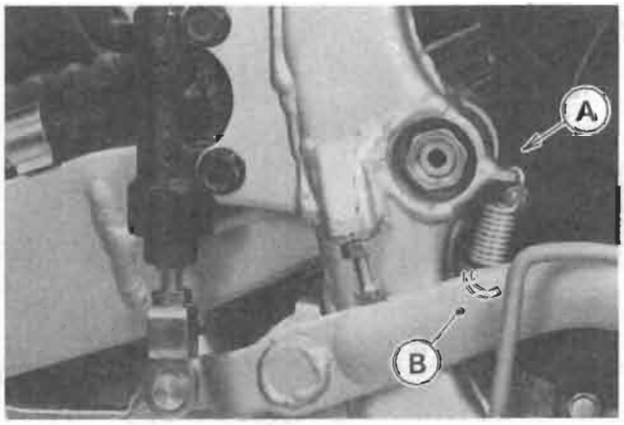
### *Rear Brake Pedal Installation Notes*

●Grease the O-rings and the shaft liberally.

●Tap the brake pedal into the frame.

○Be sure to install the O-rings in the boss, and be careful not to pinch the O-rings.

●Install the brake pedal return spring noting the hook position and direction.




A. Small Hook B. Large Hook

●Check the brake pedal position and adjust it if necessary (see Brake chapter).

# Suspension

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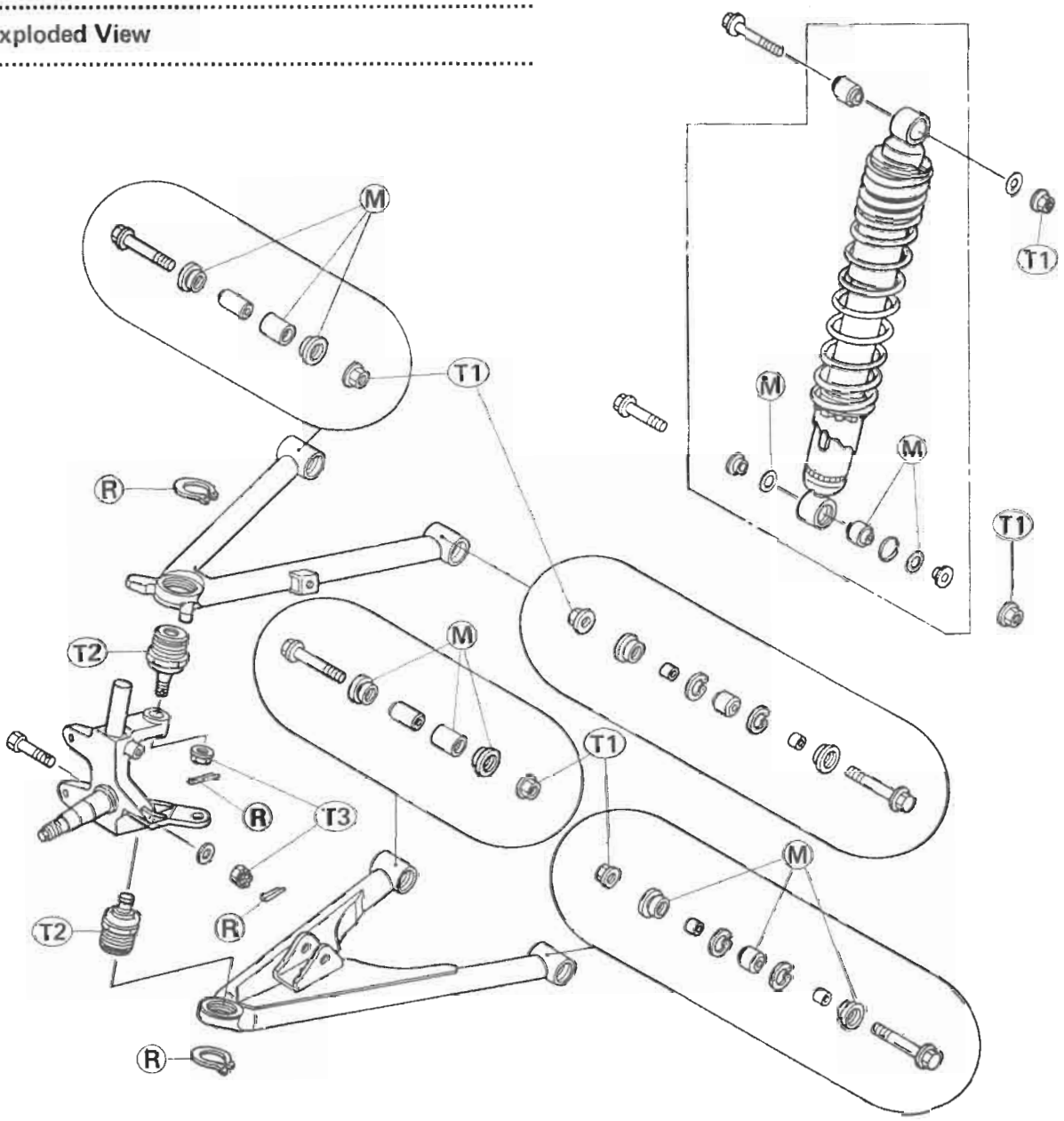

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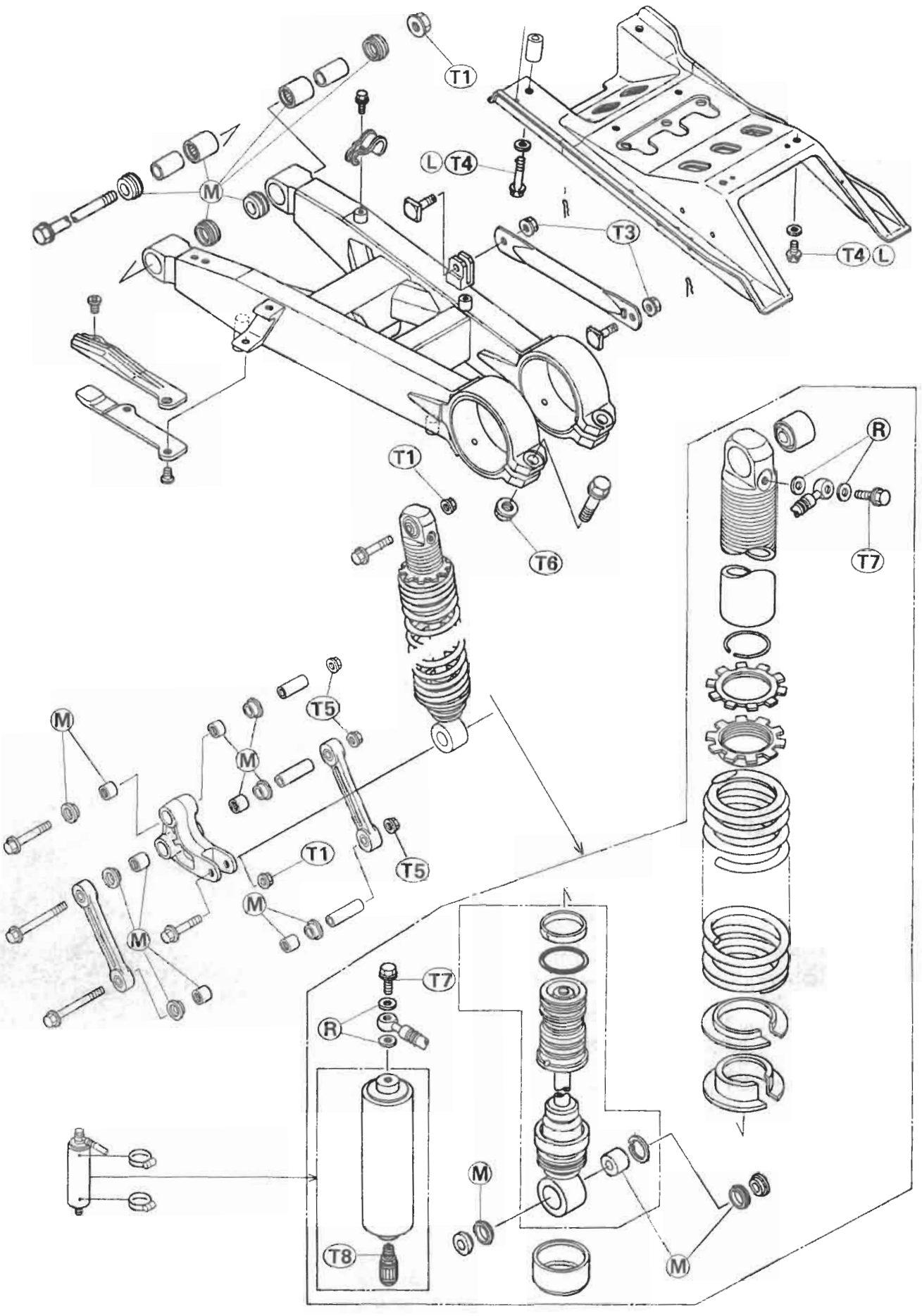
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## Exploded View




L : Apply non-permanent locking agent.
M : Apply molybdenum disulfide grease.
R : Replacement Parts

T1 : 34 N·m (3.5 kg-m, 25 ft-lb)
T2 : 44 N·m (4.5 kg-m, 33 ft-lb)
T3 : 41 N·m (4.2 kg-m, 30 ft-lb)
T4 : 31 N·m (3.2 kg-m, 23 ft-lb)
T5 : 110 N·m (11.0 kg-m, 80 ft-lb)
T6 : 64 N·m (6.5 kg-m, 47 ft-lb)
T7 : 29 N·m (3.0 kg-m, 22 ft-lb)
T8 : 12 N·m (1.2 kg-m, 104 in-lb)


T1
L T4
M
T3
T4 L
T1
T6
R
T7
T5
M
T1
T5
M
M
T7
R
T8
M
M

## Specifications

Front shock Absorber Spring Preload
Standard setting position: No. 3

Rear Shock Absorber Spring Preload
Standard adjusting nut position: 42 mm
Nut adjusting range: 28 – 51 mm
Standard spring preload: 90 kg (199 lb)
Preload change per turn of the nut: 7.5 kg (16.5 lb)

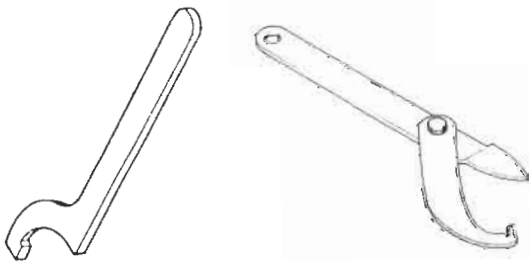
Rear Shock Absorber Damping Force
Standard setting position: No. 2

Rear Shock Absorber Oil
Type: KYB K2-C, Bel-Ray SE2 #40, or SAE 5W
Total amount: 198 ±3 mL

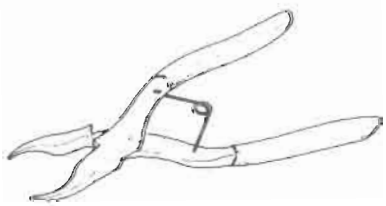
Rear Shock Absorber Gas Pressure
Standard: 980 kPa (10 kg/cm$^2$m 142 psi)
Usable range: 885 – 1,080 kPa (9 – 11 kg/cm2, 128 – 156 psi)

## Special Tools

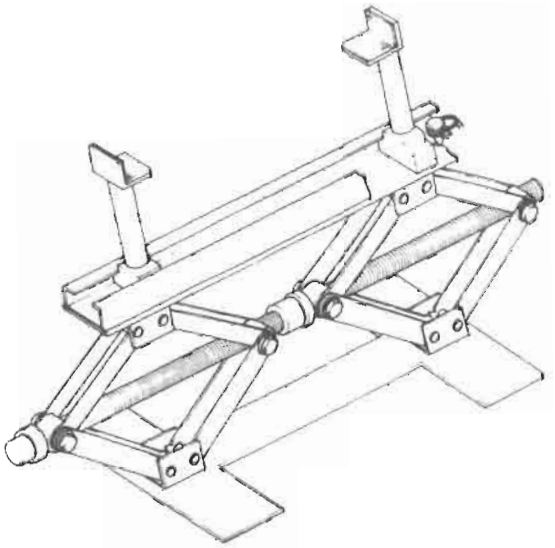
Hook Wrench: 92110-1138, or
Steering Stem Nut Wrench: 57001-1100



Inside Circlip Pliers: 57001-143



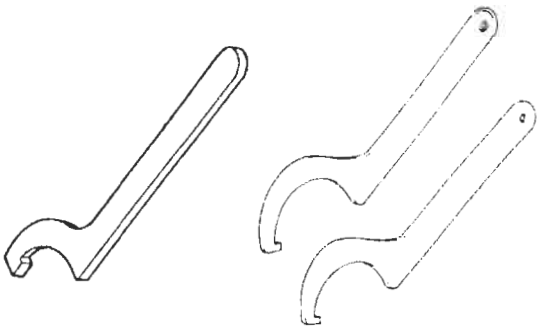
Jack: 57001-1238



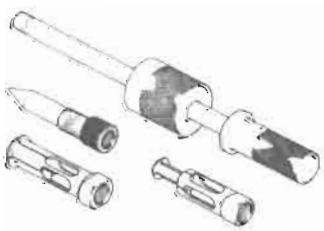
Bearing Driver Set: 57001-1129



Hook Wrenches: 92110-1138, or 57001-1101



Oil Seal and Bearing Remover: 57001-1058



## Shock Absorbers

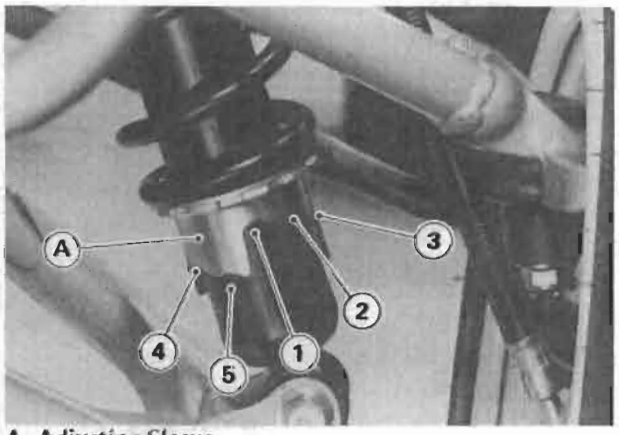
### *Front Shock Absorber Preload Adjustment*

The spring adjusting sleeve on each shock absorber has 5 positions so that the spring can be adjusted for different terrain and loading conditions.

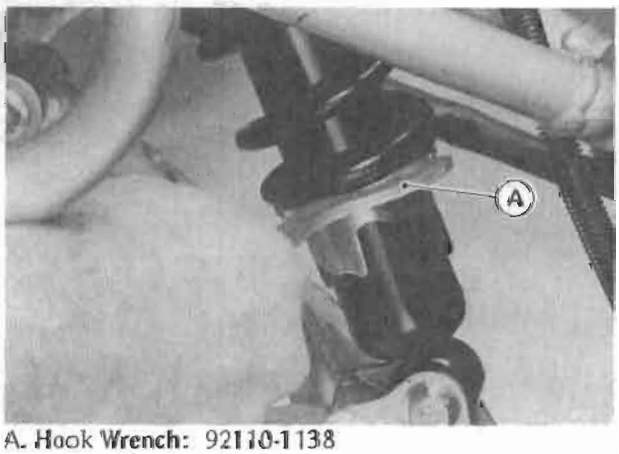
If the spring action feels too soft or too stiff, adjust it in accordance with the following table using a hook wrench (owner's tool or special tool).

**Spring Action**

| Position | Spring Force | Setting | Load | Terrain | Speed |
|---|---|---|---|---|---|
| 1 | | Soft | Light | Smooth | Low |
| 2 | | ↑ | ↑ | ↑ | ↑ |
| 3 | | | | | |
| 4 | | ↓ | ↓ | ↓ | ↓ |
| 5 | Stronger | Hard | Heavy | Rough | High |




A. Adjusting Sleeve




A. Hook Wrench: 92110-1138
Steering Stem Nut Wrench: 57001-1100

○The standard setting position is No. 3.

**WARNING**

○**If both spring adjusting sleeves are not adjusted equally, handling may be impaired and a hazardous condition may result.**

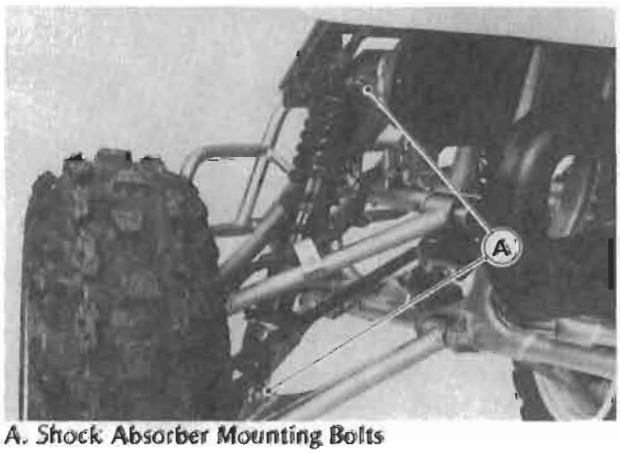
### *Front Shock Absorber Removal*

- Loosen the upper and lower shock absorber mounting nuts.
- Support the vehicle on the jack (special tool) so that the front wheels are off the ground.




A. Jack: 57001-1238

- While holding the wheel, remove the upper and lower shock absorber mounting bolts and nuts.
- Take out the shock absorber.




A. Shock Absorber Mounting Bolts

### *Front Shock Absorber Installation Notes*

- Shock absorber installation is the reverse of removal. Note the following.
- Inspect and lubricate the pivot (see Front Shock absorber Inspection and Lubrication).
- Tighten the upper and lower shock absorber mounting bolts to the specified torque (see Exploded View).

### *Front Shock Absorber*

#### *Inspection and Lubrication*

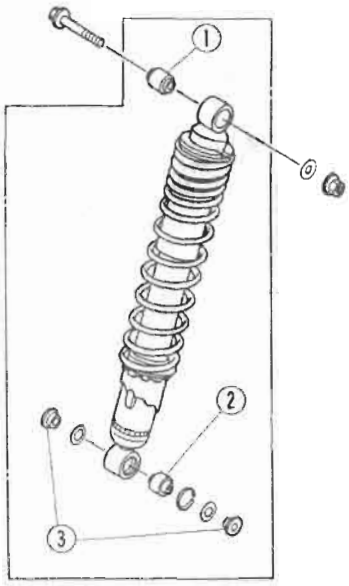
Since the front shock absorbers are sealed units which cannot be disassembled, only external checks are necessary.

★If one unit is damaged, replace both shock absorbers as a set. If only one unit is replaced and the two are not balanced, vehicle instability at high speed may result.

●Check the rubber bushings in the upper pivot.

★If the bushing is worn, cracked, hardened, or otherwise damaged, replace it.

**Front Shock Absorber**




1. Rubber Bushing
2. Spherical Bearing
3. Grease Seals

●Wipe all the old grease off the spherical bearing, and grease seals. If necessary, wash them in high-flash point solvent.

**WARNING**

**○Wash the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

●Inspect the spherical bearing and grease seals for damage.

★If roughness, excessive play, or seizure is found, replace the spherical bearing.

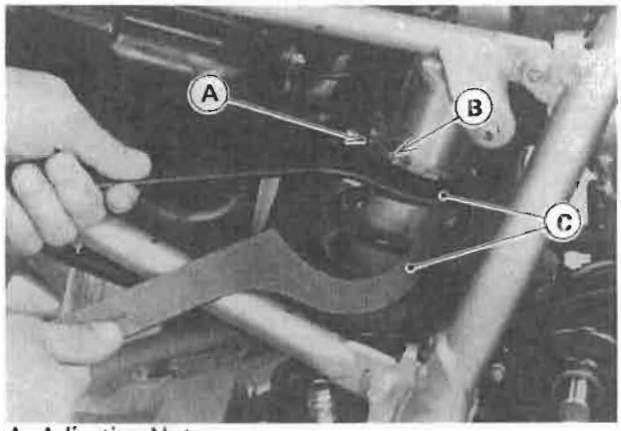
●Pack the spherical bearing and grease seals with molybdenum disulfide grease.

### *Rear Shock Absorber Preload Adjustment*

The spring adjusting nut on the rear shock absorber can be adjusted for different riding and loading conditions. If the spring action feels too soft or too stiff, adjust it in accordance with the following procedure:

●Remove the following parts.
Rear Fender and Seat (see Frame chapter)
Rear Muffler (see Engine Top End chapter)

●Using the hook wrenches (owner's tool or special tool), loosen the locknut and turn the adjusting nut as required.




A. Adjusting Nut
B. Locknut
C. Hook Wrenches: 92110-1138 (Owner's tool), or 57001-1101

●Turning the adjusting nut downward makes the spring action harder and upward softer.

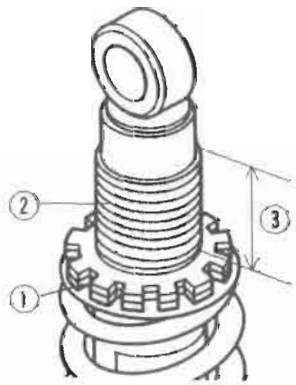
●Tighten the locknut.

●Measure the nut position shown, and adjust the spring as follows:

**Spring Preload Setting**

**Standard adjusting nut position: 42 mm**
**Nut adjusting range: 28 – 51 mm**
**Standard spring preload: 90 kg (199 lb)**
**Preload change per turn of the nut: 7.5 kg (16.5 lb)**

**Preload Adjustment**




1. Adjusting Nut
2. Rear Shock Absorber
3. Adjusting Nut Position

### *Rear Shock Absorber Damping Force Adjustment*

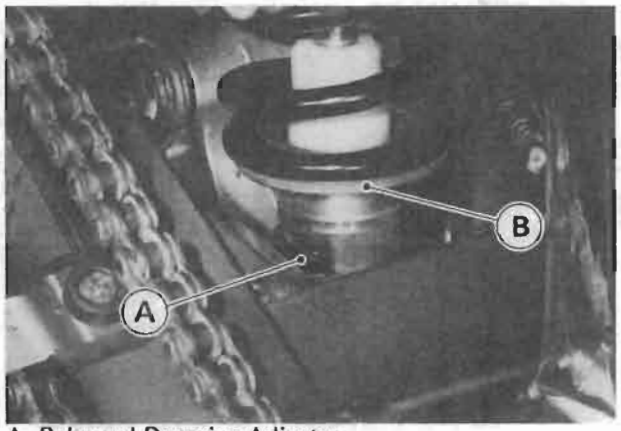
The damper adjuster on the rear shock absorber has 4 positions so that the damping force can be adjusted for different terrain and loading conditions.

☆If the damper setting feels too soft or too stiff, adjust it in accordance with the following table:

**Rebound Damping Force Adjustment**

| Position | I | II | III | IIII |
|---|---|---|---|---|
| Damping Force | ⟶ | | | Stronger |
| Standard | 2 | | | |

- Slide down the rubber boot on the lower end of the rear shock absorber.
- Turn the damper adjuster to the desired number until you feel a click.

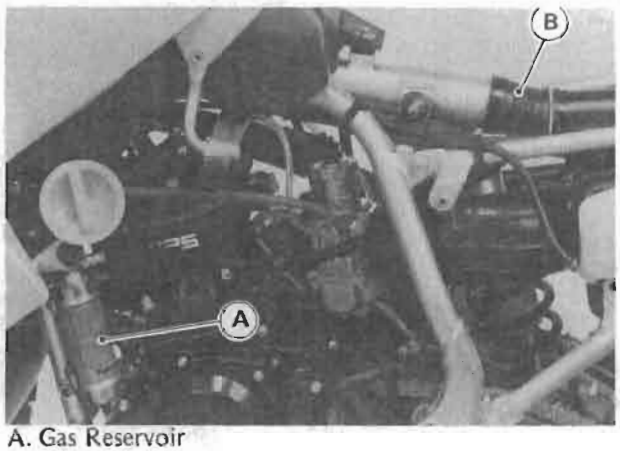



A. Rebound Damping Adjuster
B. Rear Shock Absorber

### *Rear Shock Absorber Removal*

- Remove the following parts.

Rear Fender and Seat (see Frame chapter)
Upper Air Cleaner Duct
Rear Shock Gas Reservoir
Rear Shock Mounting Nuts (Do not remove the bolts yet)



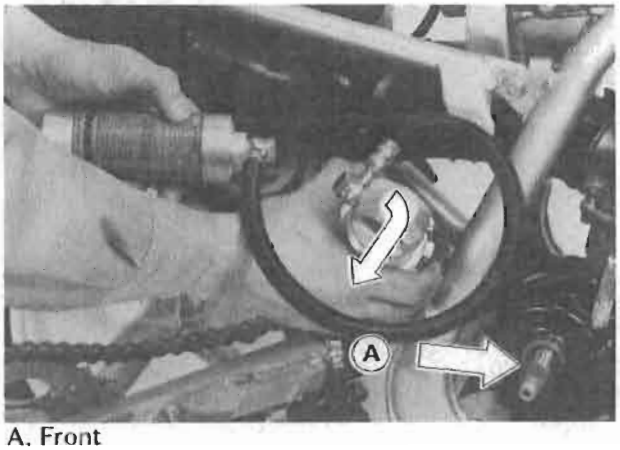

A. Gas Reservoir
B. Upper Air Cleaner Duct

- Place the jack (special tool) under the rear part of the frame.




A. Jack: 57001-1238

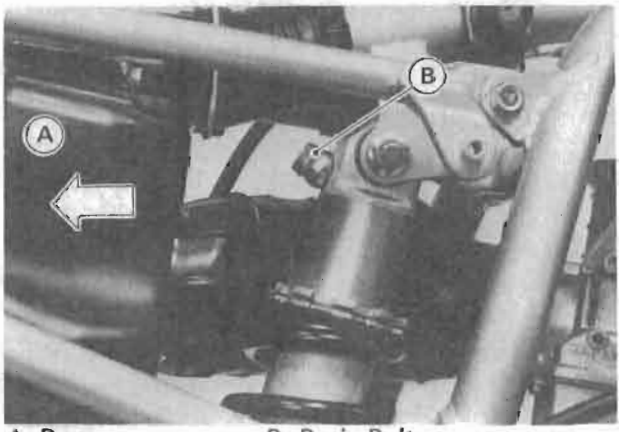
- Remove the mounting bolts of the rear shock absorber starting from top to bottom.
- Lift out the rear shock absorber upward and remove it from the vehicle right side along with the gas reservoir.




A. Front

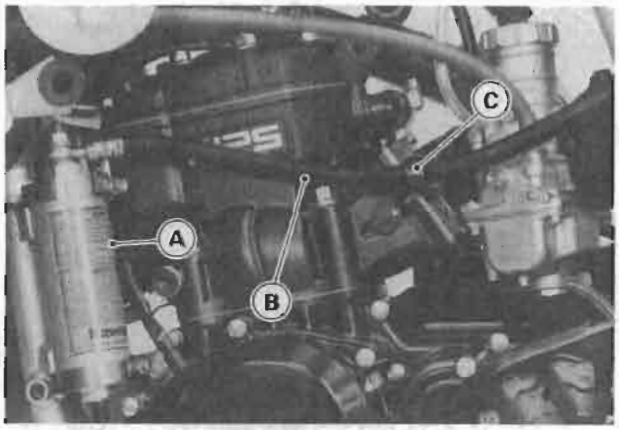
### *Rear Shock Absorber Installation Notes*

- Inspect and lubricate the pivot of the shock absorber (see Rear Shock Absorber Pivot Inspection and Lubrication).
- Install the shock absorber so that the banjo bolt on the shock body faces the rear.



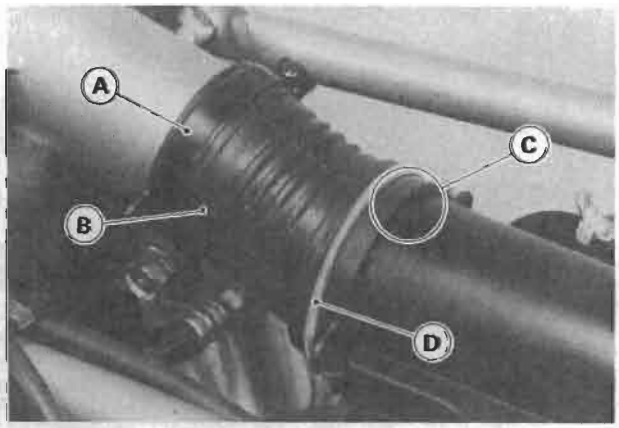

A. Rear B. Banjo Bolt

- Install the rear shock absorber mounting bolts from the vehicle left side.
- Adjust the jack height and Uni-Trak arm height to allow the shock absorber mounting bolts to slide in.
- Tighten the mounting bolts and nuts to the specified torque (see Exploded View).
- Route the oil hose through the clamp and install the gas reservoir.




A. Gas Reservoir
B. Oil Hose
C. Clamp

- Install the upper air cleaner duct by aligning the location marks. Be sure to tighten the duct clamp and install the spring band in place.

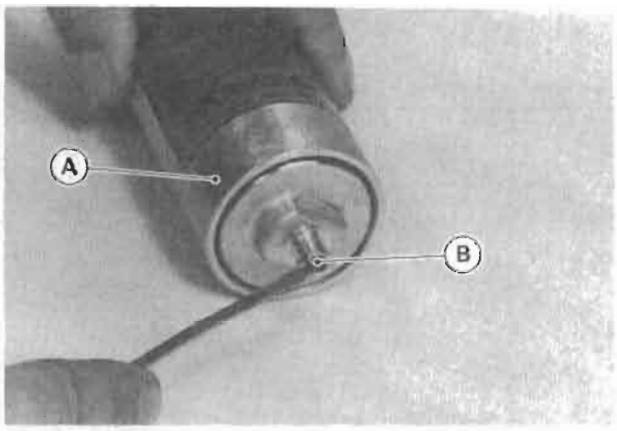



A. Clamp
B. Upper Air Cleaner Duct
C. Location Marks
D. Spring Band

### *Rear Shock Absorber Disassembly and Oil Draining*

The oil should be changed in accordance with the Periodic Maintenance Chart (see General Information chapter).

- Remove the rear shock and gas reservoir from the frame.
- Point the reservoir valve away from you. Slowly release the nitrogen gas pressure from the gas reservoir by pushing down the valve core with a screwdriver.



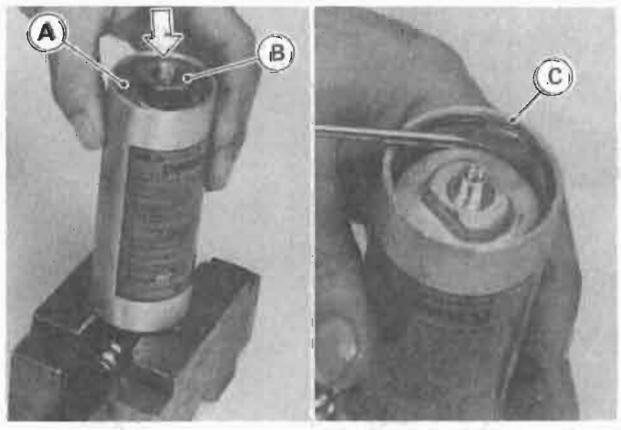

A. Gas Reservoir
B. Valve

**WARNING**

**○Be sure to point the reservoir valve away from you when releasing the nitrogen gas pressure. An oil mist is often released with the nitrogen.**

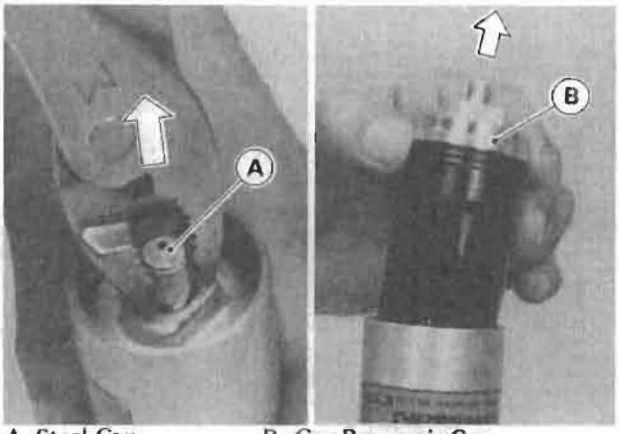
**○Always release the nitrogen gas pressure before disassembling the rear shock absorber to prevent explosive separation of parts.**

- Push the reservoir cap on the valve end in 7 mm using a press and suitable blocks.
- Remove the circlip from the gas reservoir.



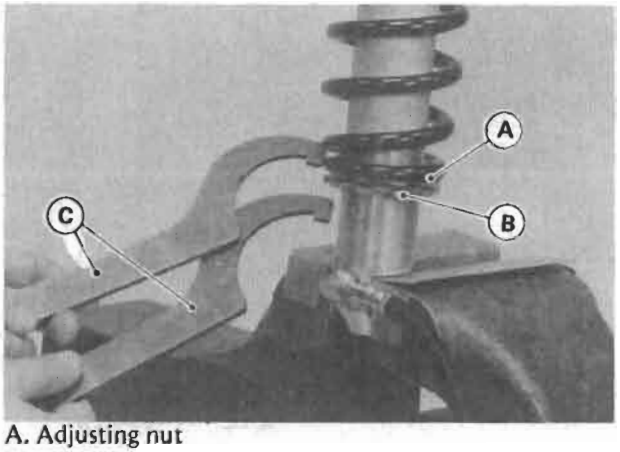

A. Gas Reservoir Cap
B. Suitable Collar or Nut
C. Circlip

- Install a steel tire valve cap on the gas reservoir valve, hold the steel cap with pliers, and pull the gas reservoir cap out of the gas reservoir.



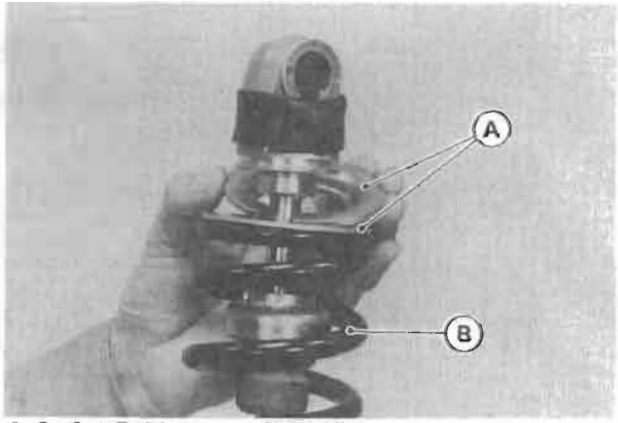

A. Steel Cap B. Gas Reservoir Cap

- Pour the oil out of the gas reservoir.
- Hold the end of the rear shock with a vise as shown. Be careful not to damage the hose.
- Using the hook wrenches (special tools), loosen the locknut and turn the adjusting nut all the way down.



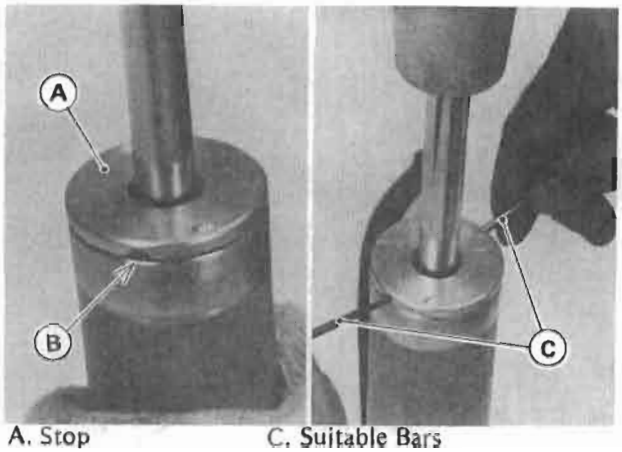

A. Adjusting nut
B. Locknut
C. Hook Wrenches: 92110-1138, or 57001-1101

- Slide down the rubber bumper.
- Remove the spring guides and pull off the spring.



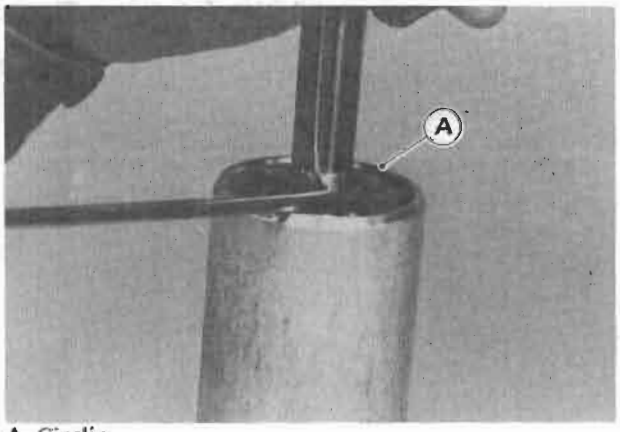

A. Spring Guides B. Spring

- Adjust the damping adjuster to the No. 1 position.
- Pry at the gaps in the stop with suitable tools to free the stop from the rear shock body.




A. Stop C. Suitable Bars
B. Pry Points

- Slide the stop up to the top of the push rod, then lightly tap around the seal with a suitable rod to push the seal assembly 7 mm down.
- Remove the circlip.

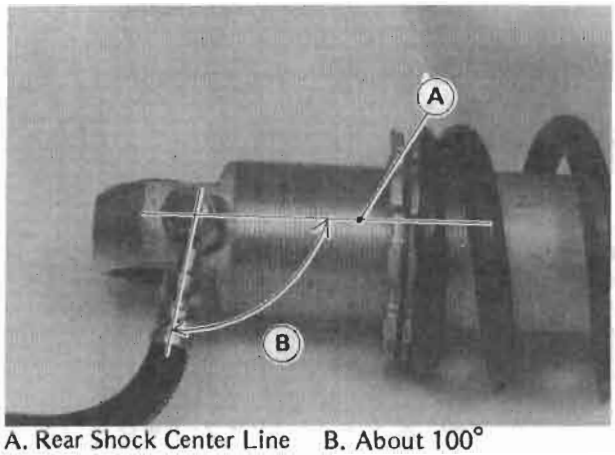



A. Circlip

- Lightly move the push rod back and forth, and pull out the push rod assembly.
- Pour the remaining oil out of the rear shock body.

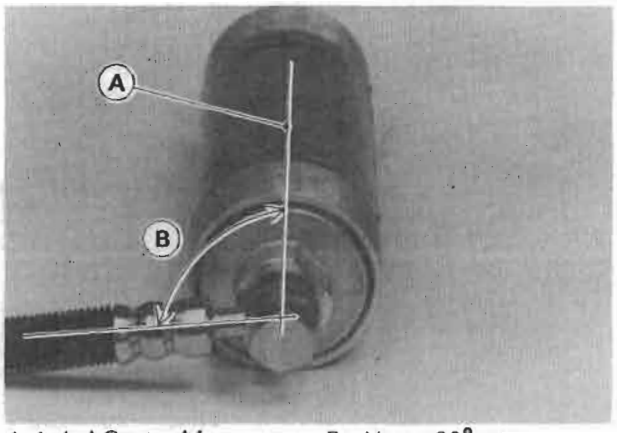
### *Rear Shock Absorber Assembly and Oil Filling*

- Assembly is the reverse of disassembly. Note the following.
- Inspect and lubricate the shock pivot (see Rear Shock Pivot Inspection and Lubrication).
- Usually, the banjo bolts are not removed during disassembly. But, if the bolts have been removed, install them as follows.
- Replace the banjo bolt copper washers with new ones.
- Install the banjo bolt at the end of the shock body so that the angle of the hose joint is about 100° to the shock body center line.



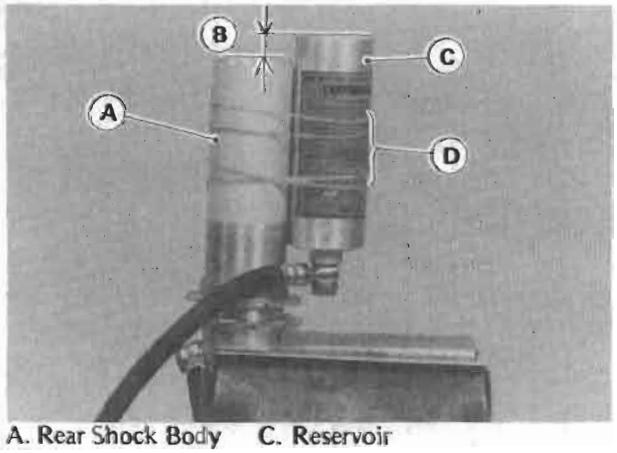

A. Rear Shock Center Line B. About 100°

○Install the banjo bolt at the reservoir as shown.



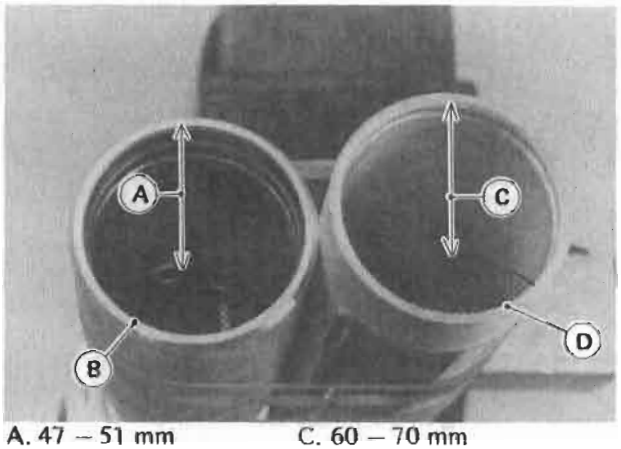

A. Label Center Line. B. About 90°

○Tighten the banjo bolts to the specified torque (see Exploded View).
●Hold the shock body vertically in a vise with the opening upward.
●Turn the damping adjuster to the **No.1** position.
●Secure the gas reservoir beside the shock body with the opening upward using rubber bands. The upper end of the reservoir should be about **16 mm** higher than the end of the shock body.




A. Rear Shock Body C. Reservoir
B. About 16 mm D. Rubber Bands

●Pour the specified oil into the rear shock body to **47 – 51 mm** from the end of the body.
●Pour the specified oil into the reservoir to **60 – 70 mm** from the end of the reservoir.
○Move the reservoir up or down to get the specified oil levels.




A. 47 – 51 mm C. 60 – 70 mm
B. End of Shock Body D. End of Reservoir

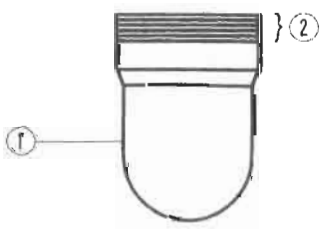
**Rear Shock Oil**

| | |
|---|---|
| **Type:** | **KYB K2-C, Bel-Ray SE2 #40, or SAE 5W** |
| **Amount:** | |
| **Total:** | **198 ±3 mL** |
| **Shock body:** | **143 mL** |
| **Reservoir:** | **55 mL** |
| **Oil level:** | |
| **Shock body:** | **47 – 51 mm from the end of the body** |
| **Reservoir:** | **60 – 70 mm from the end of the reservoir** |

**NOTE**

○*Pump the shock push rod several times until all air bubbles have been removed.*

●Check that the bladder on the gas reservoir cap is not partially collapsed.
★If it is, open the valve core with a screwdriver to allow the collapsed bladder to fill with air, and return to normal shape.
●Check the bladder for sign of damage or crack. If necessary, replace it with a new one.




1. Bladder 2. Lip

**CAUTION**

○**Do not use a damaged or partially collapsed bladder, because it may burst, gently reducing rear shock performance.**

•Grease the lip of the bladder.
•Holding the reservoir vertically, slowly insert the bladder until the reservoir cap just clears the circlip groove.
•Wipe up any spilled oil.

**CAUTION**

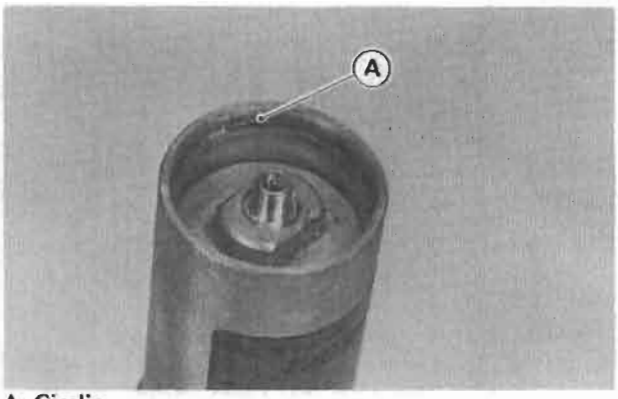
○**Ensure that no air remains in the system.**

•Check the circlip for weakening, deformity and flaws. If necessary, replace it with a new one.

**WARNING**

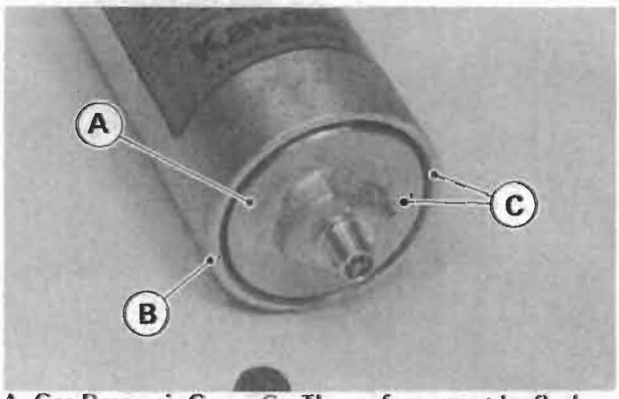
○**If a weakened, deformed or flawed circlip is used, the gas reservoir cap may not hold when injecting the nitrogen gas. This would allow oil and internal parts to explode out of the reservoir.**

•Mount the circlip in the groove in the gas reservoir.




A. Circlip

•**Install a steel tire valve cap on** the gas reservoir valve, **hold the steel cap with pliers, and pull up the reservoir cap against the circlip. The end of the reservoir cap must be flush with the end of the** gas reservoir.

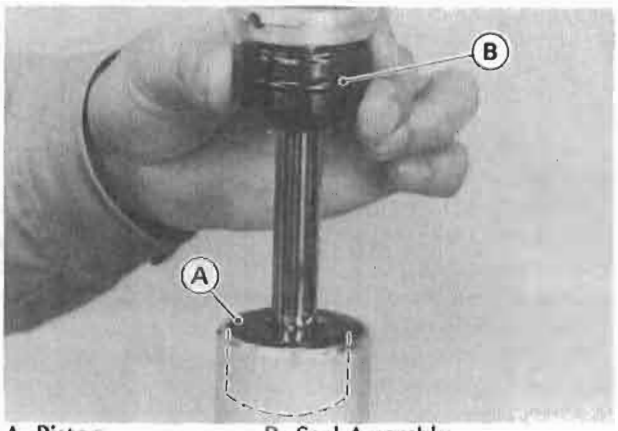



A. Gas Reservoir Cap
B. Gas Reservoir End
C. The surfaces must be flush.

**WARNING**

○**If the end of the gas reservoir cap and the end of the gas reservoir are not flush, the circlip is not correctly fitted in the groove in the gas reservoir or is deformed. In this case, the oil and internal parts could explode out of the reservoir when injecting the nitrogen gas or while riding the vehicle.**

•Insert the piston end of the push rod assembly into the the rear shock body slowly. Do not insert the seal assembly yet.




A. Piston
B. Seal Assembly

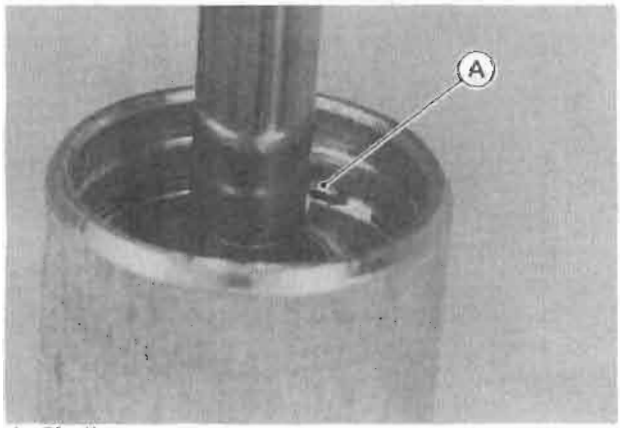
**CAUTION**

○**Ensure that no air remains in the system.**

•Push the seal assembly into the shock body until it just clears the circlip groove.
★If the circlip is deformed or damaged, replace it with a new one.
•Fit the circlip into the groove in the shock body.

**CAUTION**

○**If the circlip is not a certain fit in the groove in the shock body, the push rod assembly may come out of the shock absorber when injecting the nitrogen gas or riding the vehicle.**




A. Circlip

●Pull up the push rod assembly against the circlip.
●Force the stop into the shock body by lightly tapping around the edge of the stop with a mallet.
●Inject nitrogen gas to a pressure of **50 kPa (0.5 kg/cm², 7 psi)** through the valve on the gas reservoir with the push rod assembly up.
●Check the shock body and gas reservoir for oil and gas leaks.
★If there are no leaks, inject the nitrogen gas to the specified pressure.

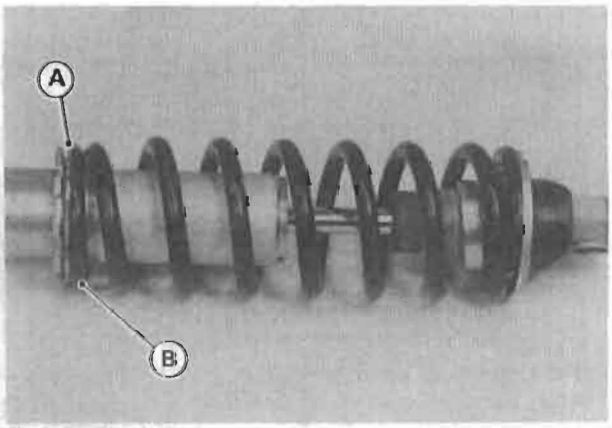
**Rear Shock Absorber Gas Pressure**

| | |
|---|---|
| **Standard:** | **980 kPa (10 kg/cm², 142 psi)** |
| **Usable range:** | **885 – 1,080 kPa (9 – 11 kg/cm², 128 – 156 psi)** |

**WARNING**

○**Pressurize the gas reservoir with nitrogen gas only. Do not use air or other gases, since they may cause premature wear, rust, fire hazard or substandard performance.**
○**Never exceed the maximum pressure of the adjustable range, or the oil and internal parts could explode.**
○**High pressure gas is dangerous. Have a qualified mechanic perform this procedure.**

●Install the shock absorber spring so that the smaller diameter end is next to the adjusting nut.




A. Adjusting Nut B. Smaller Diameter End

●Adjust the spring preload and damping adjuster.
●Install the rear shock absorber.

### *Rear Shock Absorber Pivot Inspection and Lubrication*

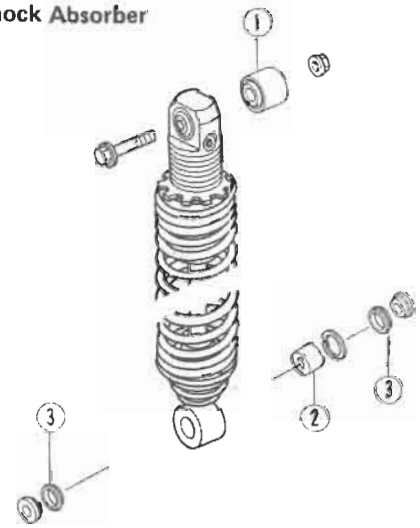
●Check the rubber bushing in the upper pivot.
★If the bushing is worn, cracked, hardened, or otherwise damaged, replace it.
●Wipe all the old grease off the spherical bearing, and grease seals in the lower pivot. If necessary, wash them in high-flash point solvent.

**WARNING**

○**Wash the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

●Inspect the spherical bearing for damage.
★If roughness, excessive play, or seizure is found, replace the spherical bearing.

**Rear Shock Absorber**




1. Rubber Bushing 3. Grease Seals
2. Spherical Bearing

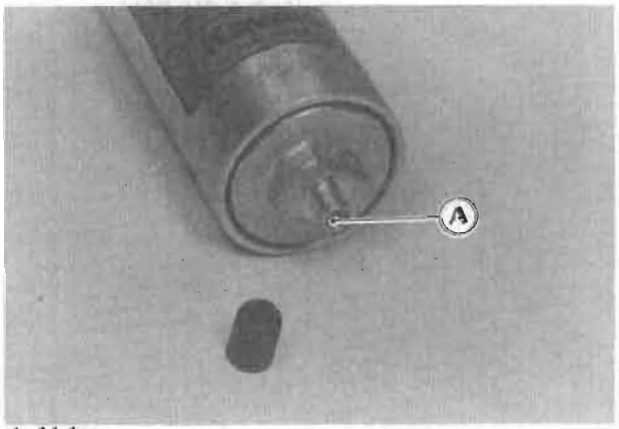
●Pack the spherical bearing and grease seals with molybdenum disulfide grease.

### *Rear Shock Absorber Scrapping*

●Remove the rear shock absorber from the frame.
●Remove the valve cap and release the nitrogen gas completely from the gas reservoir.

**WARNING**

○**Since the high pressure gas is dangerous, do not point the valve toward your face or body.**




A. Valve

- Release the gas completely by removing the valve before scrapping.

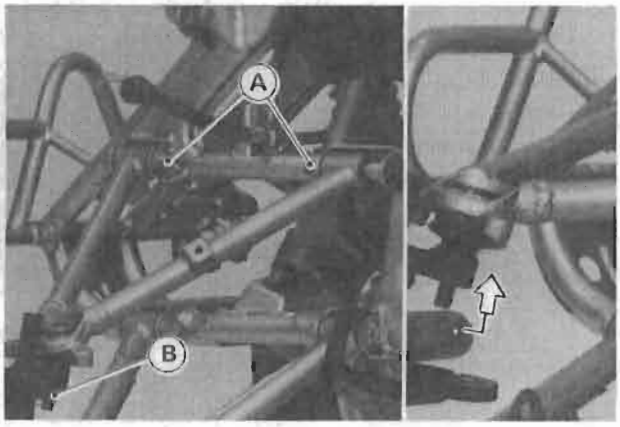
**WARNING**

**Do not incinerate a shock absorber without first removing the valve or it may explode.**

## Suspension Arms

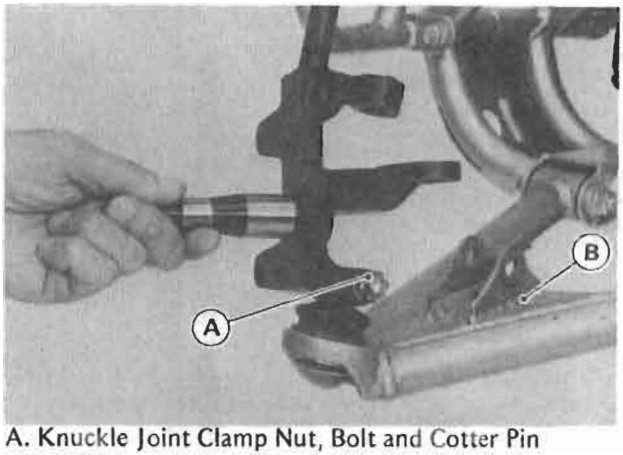
### *Suspension Arm Removal*

- Remove the front wheel (see Wheel Removal in the Wheels/Tires chapter).
- Remove the caliper and let it hang free.
- Take off the following parts.
  - Front Shock Absorber
  - Brake Hose Clamp on Upper Suspension Arm
- Remove the caliper with the hose installed and run it through the upper suspension arm.
- Remove the cotter pin and knuckle joint nut at the upper suspension arm, then pry the knuckle joint out.
- Unscrew the upper suspension arm pivot bolts and nuts.
- Remove the upper suspension arm.




A. Upper Suspension Arm Pivot Bolts and Nuts
B. Knuckle Joint Cotter Pin and Nut

- Remove the cotter pin and loosen the knuckle joint clamp nut and bolt to take off the steering knuckle.
- Take off the lower suspension arm by removing the pivot bolts and nuts.




A. Knuckle Joint Clamp Nut, Bolt and Cotter Pin
B. Lower Suspension Arm

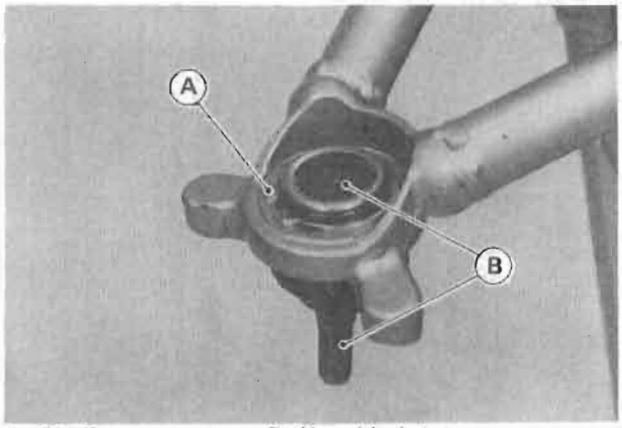
- Repeat the same procedure on the other side of the vehicle.

### *Suspension Arm Installation Notes*

- Lubricate the suspension arm bearings (see Suspension Arm Inspection and Lubrication).
- Route the brake hose according to the Cable and Harness Routing section in the General Information chapter.
- Tighten the suspension arm pivot nuts and the knuckle joint nut to the specified torque (see Exploded View).

### *Suspension Arm Disassembly*

- Remove the suspension arm (see Suspension Arm Removal).
- Remove the sleeve or collars and the grease seals.
- Remove the circlips and press the spherical bearing out of the rear pivot using a press and the bearing driver set (special tool: PN 57001-1129).
- Remove the needle bearing from the front pivot using a press and the bearing driver set (57001-1129).
- Holding the suspension arm with a vise, remove the circlip and unscrew the knuckle joint.




A. Circlip B. Knuckle Joint

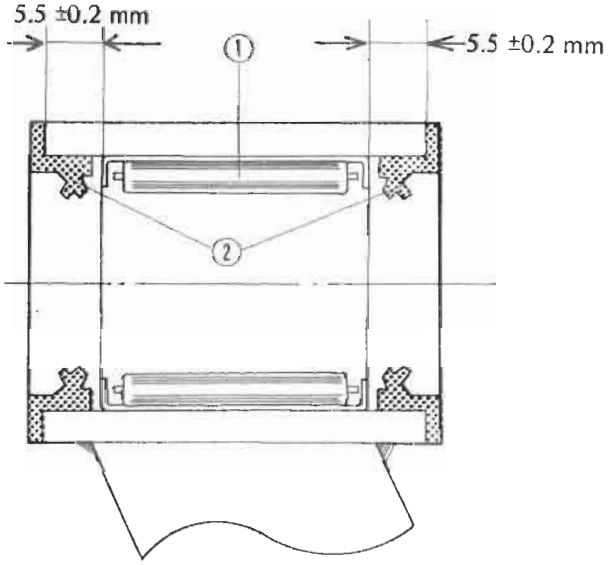
**CAUTION**

○**Do not remove the knuckle joint grease seal. It is packed with grease.**

### *Suspension Arm Assembly Notes*

- Inspect and lubricate the bearings (see Suspension Arm Inspection and Lubrication).
- Position the bearing in the arm as shown using a suitable bearing driver in the bearing driver set (special tool: PN 57001-1129).

**Suspension Arm Needle Bearing Installation:**
**Front Bearing**

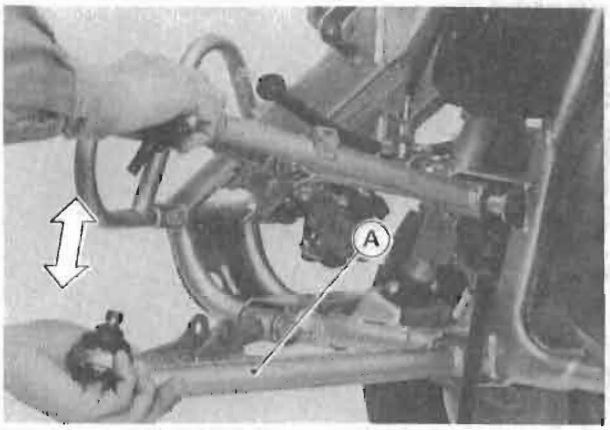



1. Needle Bearing 2. Grease Seals

- Replace the knuckle joint circlip that was removed with a new one.
- Tighten the knuckle joint to the specified torque (see Exploded View) against the suspension arm.
- Clean, check and grease the knuckle joints (see Steering Knuckle Installation Notes in the Steering chapter).

### *Suspension Arm Inspection and Lubrication*

- Remove the following parts to free the suspension arm.
  - Front Wheel
  - Front Shock Absorber
  - Caliper and Brake Hose Clamp
  - Knuckle Joint Nut
  - Knuckle Joint Clamp Nut
- Move the suspension arm up and down to check for abnormal friction, and push and pull it to check for bearing play.




A. Suspension Arms

★If abnormal friction is felt, the bearing may be damaged Remove the suspension arm to check for bearing damage.

★A small amount of play on the arm is normal and no corrective action is needed. However, if excessive play is felt, remove the suspension arm. Check for bearing wear and replace the damaged bearing.

- Wipe all the old grease off the bearings, sleeve and grease seals. If necessary, wash them in high-flash point solvent.

**WARNING**

○**Wash the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

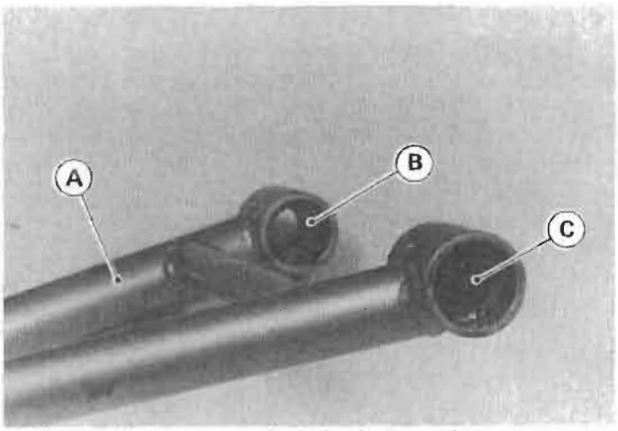
- Inspect the spherical bearing and grease seals for abrasion, color change, or other damage.

★If there is any doubt as to their condition, replace the bearing and the seals.

- The rollers in the needle bearing wear so little that the wear is difficult to measure. Instead, inspect the needle bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of the needle bearing, replace the bearing and sleeve as a set.

★If the sleeve has any visible damage, replace the sleeve and needle bearing as a set.



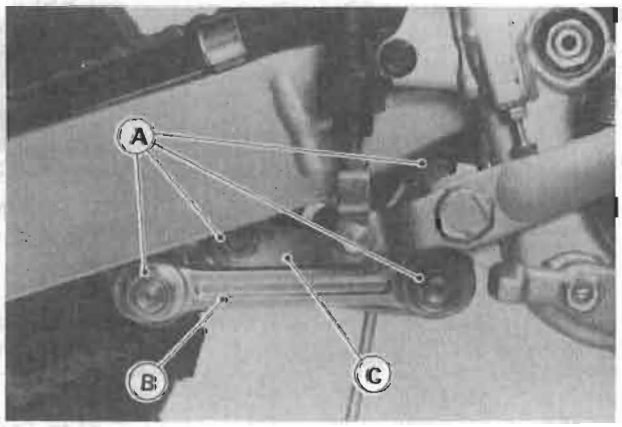

A. Suspension Arm
B. Needle Bearing
C. Spherical Bearing

●Apply molybdenum disulfide chassis assembly grease to the outer circumference of the sleeves, and pack the needle bearing and spherical bearing with the same grease.

## Uni-Trak Arm

### *Uni-Trak Arm Removal*

●Remove the chain guard by taking off the four mounting bolts.
●Remove the nuts shown.



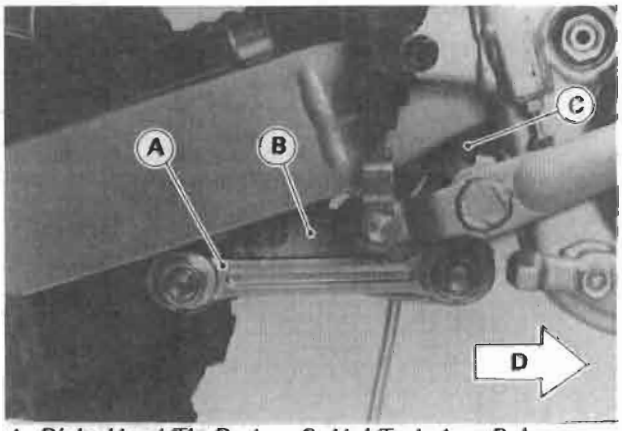

A. Nuts
B. Tie-Rod
C. Uni-Trak Arm

●Place the jack (special tool) under the rear part of the frame.




A. Jack: 57001-1238

●Remove the following parts in the order shown.
○Adjust the jack height for easy removal.
Right-Hand Tie-Rod
Left-Hand Tie-Rod
Uni-Trak Arm




A. Right-Hand Tie-Rod
B. Uni-Trak Arm
C. Uni-Trak Arm Bolt
D. Front

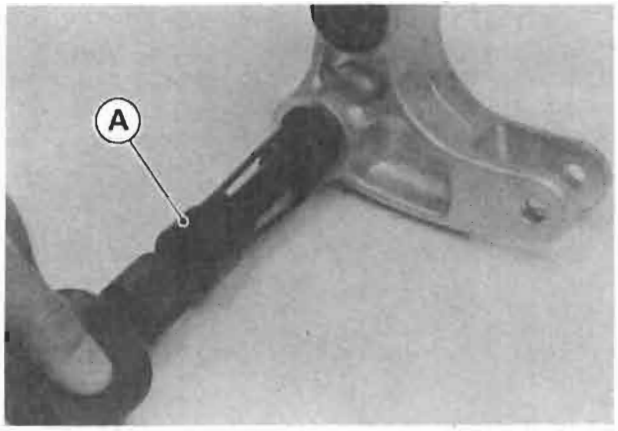
○Move the drive chain to the left while removing the arm bolt.

### *Uni-Trak Arm Installation Notes*

○Installation is the reverse of removal. Note the following.
●Inspect and lubricate the Uni-Trak arm (see Uni-Trak Arm Inspection and Lubrication).
●Install the mounting bolts from the vehicle left side.
●Install each tie-rod. Either end may face forward, but the machined side must face inboard.
●Tighten the bolts and nuts to the specified torque (see Exploded View).

### *Uni-Trak Arm Disassembly Notes*

●Hold the uni-trak arm in a vice.
●Pull out the grease seals and sleeves.
●Pull out the needle bearings using the oil seal and bearing remover and adapter (special tools: P/N 57001-1058).

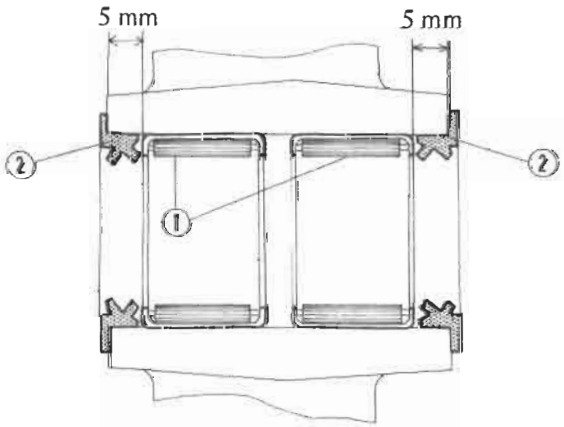



A. Oil Seal and Bearing Remover: 57001-1058

### *Uni-Trak Arm Assembly Notes*

- Inspect and lubricate the Uni-Trak arm (see Uni-Trak Arm Inspection and Lubrication).
- Position the bearings in the Uni-Trak arm as shown using a suitable bearing driver from the bearing driver set (special tool: PN 57001-1129).

**Uni-Trak Arm Bearing Installation**




1. Needle Bearings 2. Grease Seals

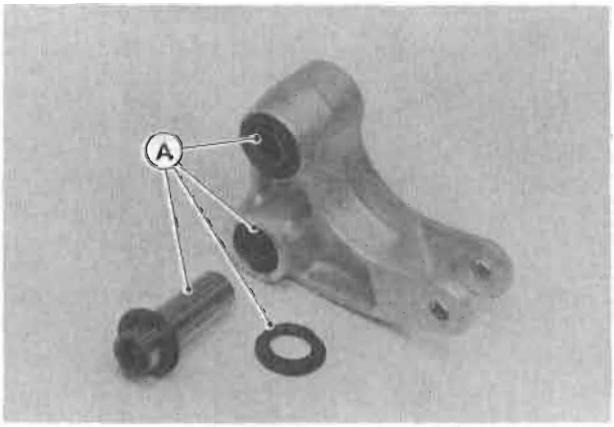
### *Uni-Trak Arm Inspection and Lubrication*

- Remove the Uni-Trak arm.
- Wipe all the old grease off the needle bearings, sleeves and grease seals. If necessary, wash them in high-flash point solvent.

**WARNING**

**Wash the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

- The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the needle bearings for abrasion, color change, or other damage.
- ★If there is any doubt as to the condition of either needle bearing, replace the bearings and sleeve as a set.
- ★If the sleeve has any visible damage, replace the sleeve and needle bearings as a set.
- Apply molybdenum disulfide chassis assembly grease to the outer circumference of the sleeves, and pack the needle bearings and grease seals with the same grease.

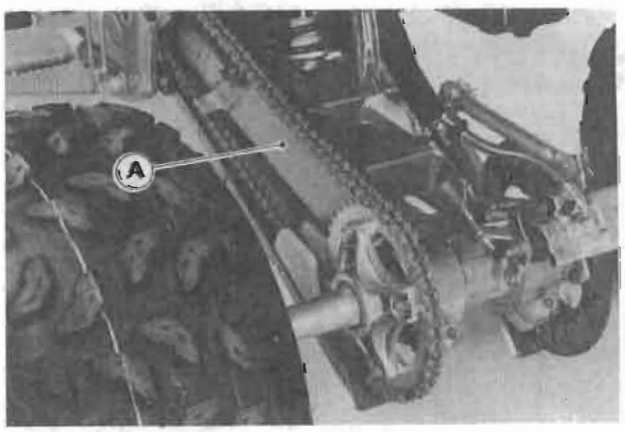



A. Grease

## Swing Arm

### *Swing Arm Inspection*

- Visually inspect the swing arm for cracks or distortion in accordance with the Periodic Maintenance Chart (see General Information chapter).

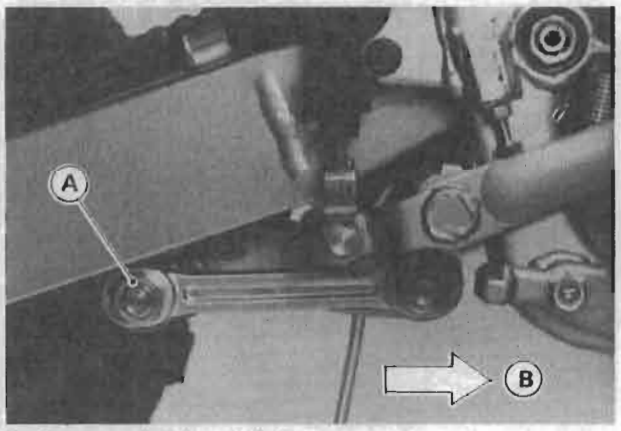



A. Swing Arm

★If damage or distortion is found, replace the swing arm.

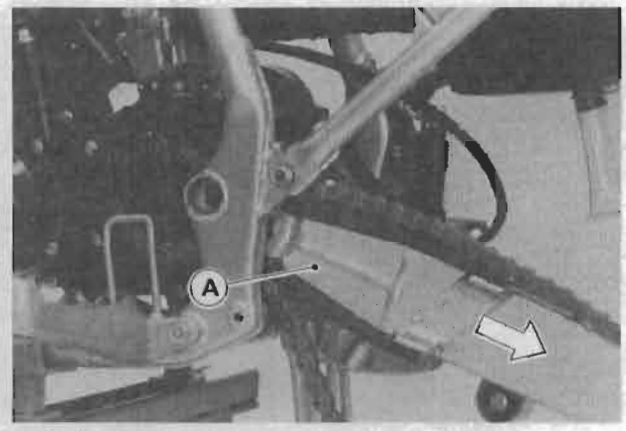
### *Swing Arm Removal*

- Take off the following parts to remove the swing arm.
  - Rear Caliper (see Brakes chapter)
  - Brake Hose and Brake Cable (see Brakes chapter)
  - Chain Guard
  - Tie-Rod Bolt and Nut
  - Rear Shock Absorber
  - Rear Wheels (see Wheels/Tires chapter)
  - Rear Axle
  - Swing Arm Shaft




A. Remove the tie-rod bolt and nut.
B. Front

- Remove the drive chain from the engine sprocket. It is not necessary to remove the engine sprocket.
- Pull back the swing arm.



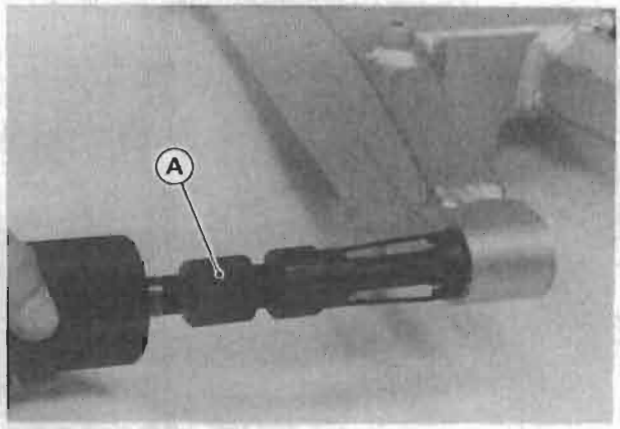

A. Swing Arm

### *Swing Arm Installation Notes*

- Inspect and lubricate the swing arm pivot (see Swing Arm Pivot Inspection and Lubrication).
- Loop the drive chain onto the swing arm.
- Temporarily install the swing arm, swing arm shaft, and the drive chain.
- Tighten the arm shaft nut to the specified torque (see Exploded View).

### *Swing Arm Disassembly Notes*

- Pull out the grease seals and sleeves.
- Pull out the needle bearings using the oil seal and bearing remover and adapter (special tools).

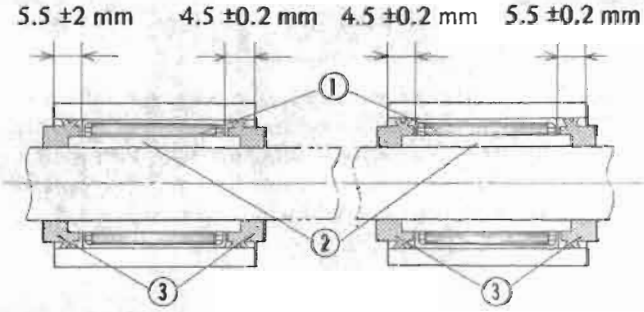



A. Oil Seal and Bearing Remover: 57001-1058

### *Swing Arm Assembly Notes*

- Inspect and lubricate the swing arm (see Swing Arm Inspection, Swing Arm Pivot Inspection and Lubrication).
- Position the bearings in the arm as shown using a suitable bearing driver from the bearing driver set (special tool: PN 57001-1129).

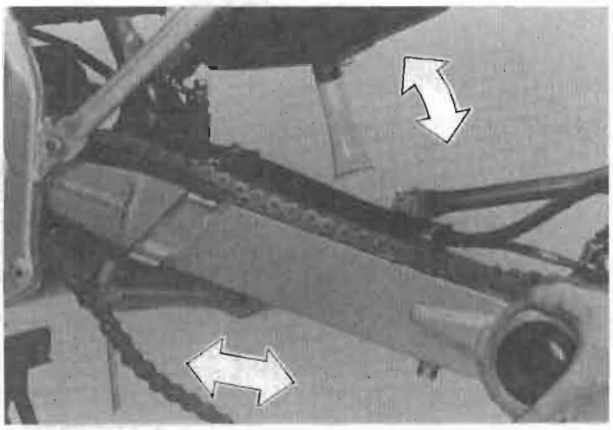
**Swing Arm Bearing Installation**




1. Needle Bearings
2. Sleeves
3. Grease Seals

### *Swing Arm Pivot Inspection and Lubrication*

- Remove the following parts to free the swing arm.
  - Rear Wheels
  - Chain Guard
  - Drive Chain
  - Rear Axle
  - Rear Caliper
  - Rear Shock Absorber
- Move the swing arm up and down to check for abnormal friction, and push and pull it back and forth to check for bearing play.



★If abnormal friction is felt, the bearing may be damaged. Remove the swing arm to check for bearing damage.

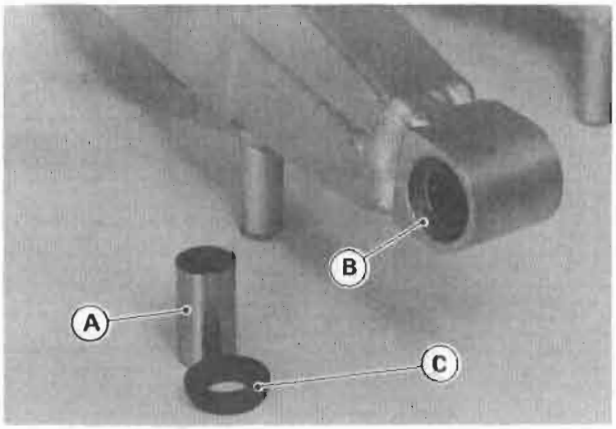
★A small amount of play on the arm is normal and no corrective action is needed. However, if excessive play is felt, remove the swing arm and inspect the bearings and sleeves.

- Replace the right and left bearings, and sleeves, if one of the bearings or sleeves is damaged.
- Wipe all the old grease off the needle bearings, sleeves and grease seals. If necessary, wash them in high-flash point solvent.

**WARNING**

**Wash the parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvent to clean parts. A fire or explosion could result.**

- Inspect the needle bearings, sleeves, and grease seals for abrasion, color change, or other damage.
- Apply molybdenum disulfide chassis assembly grease to the outer circumference of the sleeves, and pack the needle bearings with the same grease.



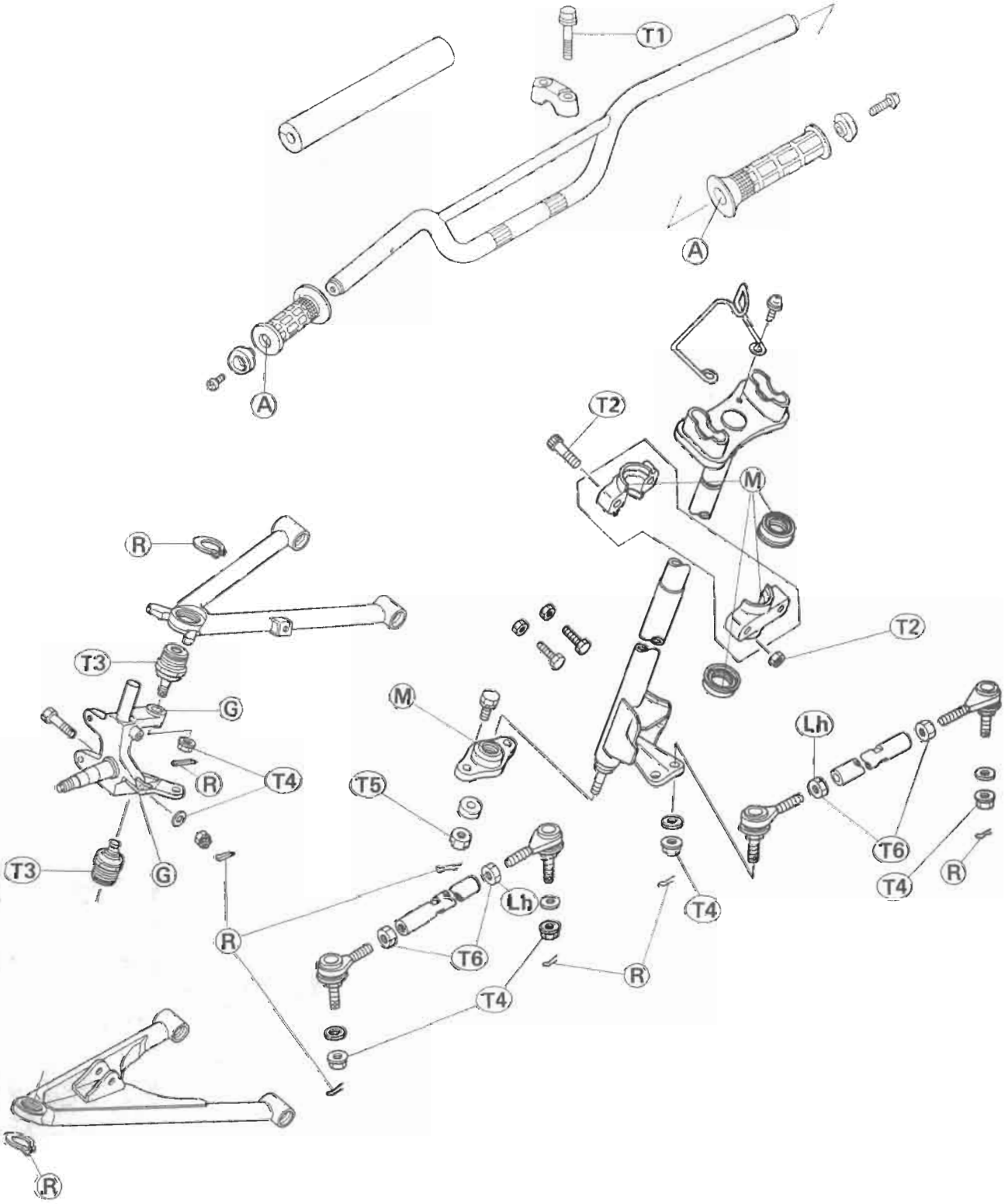

A. Sleeve
B. Needle Bearing
C. Grease Seal

# Steering

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## Exploded View




A : Apply adhesive.
G : Apply grease.
Lh: Left-Hand Threads
M : Apply molybdenum disulfide grease.
R : Replacement Parts

T1: 21 N-m (2.1 kg-m, 15.0 ft-lb)
T2: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T3: 44 N-m (4.5 kg-m, 33 ft-lb)
T4: 41 N-m (4.2 kg-m, 30 ft-lb)
T5: 29 N-m (3.0 kg-m, 22 ft-lb)
T6: 27 N-m (2.8 kg-m, 20 ft-lb)

## Specification

**Steering Angle**

| | | |
|---|---|---|
| Left | : | 40° |
| Right | : | 40° |

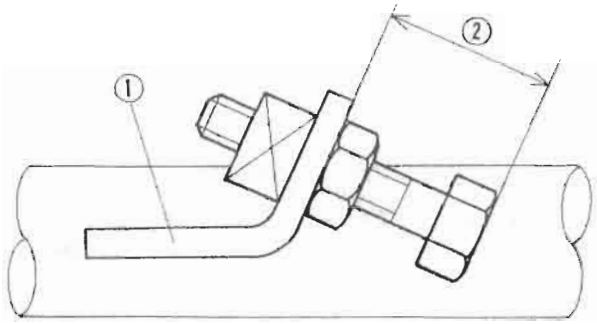
## Steering Adjustment

### *Steering Stopper Adjustment*

- Turn the handlebar all the way to the left to adjust the right steering stopper bolt, and all the way to the right to adjust the left steering bolt.
- Remove the air scoop.
- Loosen the locknut and turn the steering stopper bolt, until the head hits the steering stem bracket.

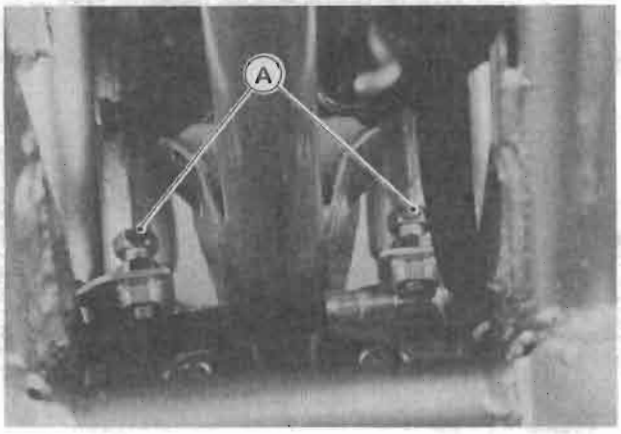
**NOTE**

○*If each bolt head protrudes 19.5 – 20.5 mm above the stay, the steering angle will be about the standard (40°).*




1. Stopper Bolt Stay
2. Stopper Bolt Protrusion

- Tighten the locknuts securely.

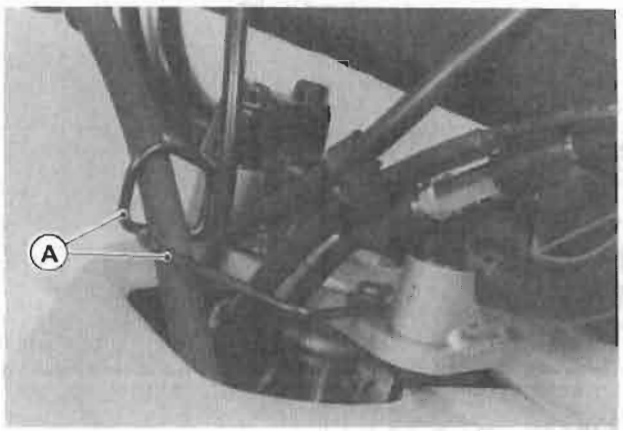



A. Steering Stopper Bolts

## Steering Removal/Installation

### *Steering Stem Removal*

- Remove the following parts.
  - Rear Fender
  - Front Fender Cover
  - Front Fender
  - Fuel Tank
  - Handlebar
  - Clamp for Cable and Hose
  - Headlight Stay



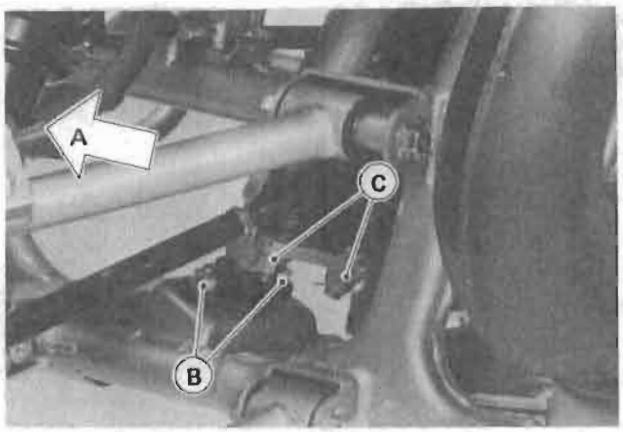

A. Clamp

- Remove the cotter pin and remove the tie-rod end nut from each tie-rod at the steering stem.

**CAUTION**

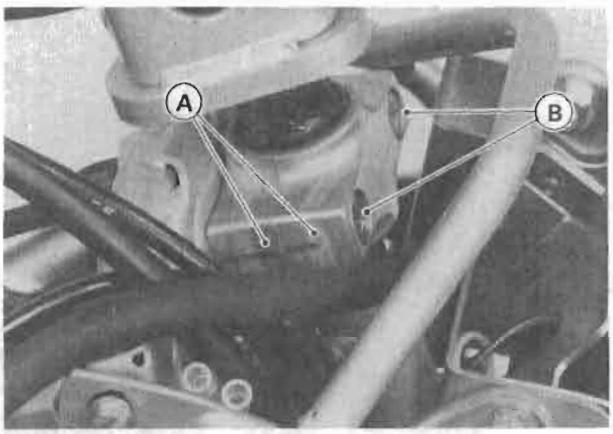
○**Do not loosen the locknuts at the ends of the tie-rod adjusting sleeve, or the toe-in of the front wheels will be changed.**

- Remove the bearing housing mounting bolts from the bottom end of the steering stem.



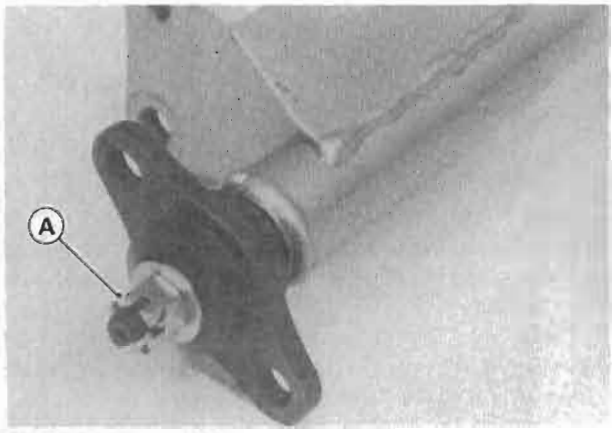

A. Front
B. Bearing Housing Mounting Bolts
C. Tie-Rod End Nuts

●Mark the steering stem clamps so that they can be installed later in the same position.
●Remove the steering stem clamp nuts and Allen bolts to take off the clamps and grease seals.




A. Marks B. Clamp Allen Bolts and Nuts

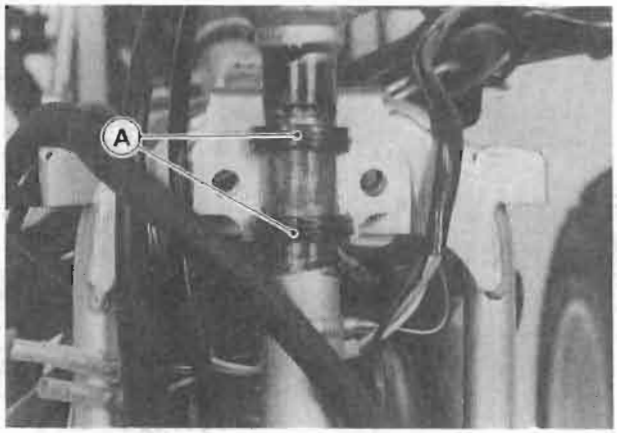
●Pull the steering stem out of the frame.
○Be careful not to damage the radiator fins.
●To remove the steering stem bearing, remove the cotter pin and nut from the bottom end of the steering stem.




A. Cotter Pin and Nut

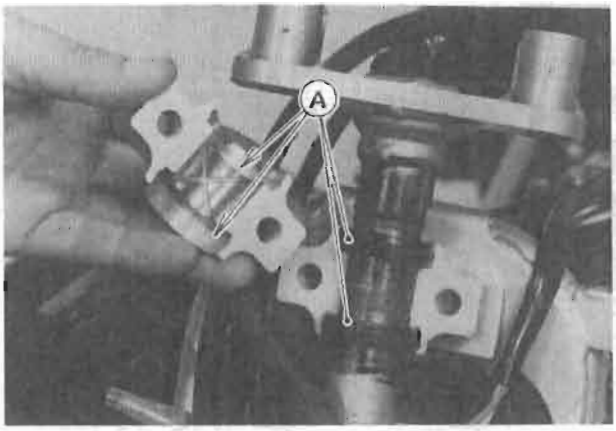
### *Steering Stem Installation Notes*

○Steering Stem Installation Notes
○Steering stem installation is the reverse of removal. Note the following.
○Lubricate the steering stem clamps, grease seals and stem bearing (see Steering Lubrication).
●Install the grease seal facing the end forward to prevent the entry of dirt.



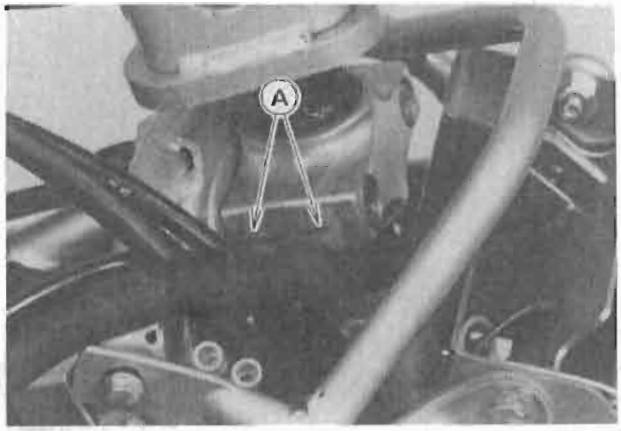

A. Ends

●Install the steering stem clamps so that the ribs on both grease seals fit into the grooves on the steering stem clamps.




A. Ribs and Grooves

●Align the marks on the steering stem clamps (The mark made during removal).




A. Marks

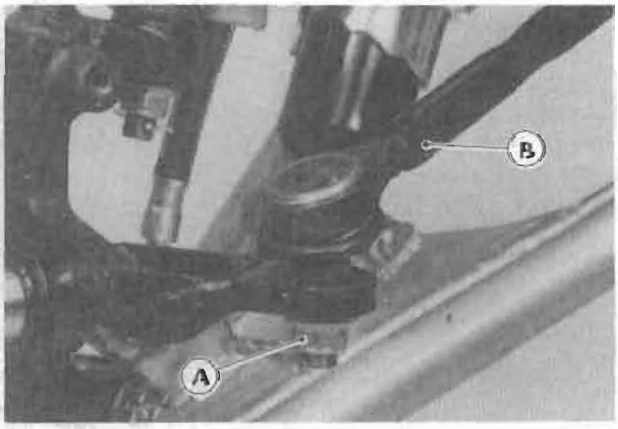
- Tighten the following parts to the specified torque (see Exploded View).
  - Stem Lower End Nut
  - Stem Clamp Nuts and Allen Bolts
  - Tie-Rod End Nuts
- Run the cables, the hoses and the harness according to the Cable and Harness Routing section in the General Information chapter.
- Inspect the toe-in if necessary (see Toe-in Inspection in the Wheels/Tires chapter).
- Adjust the steering stopper if necessary (see Steering Stopper Adjustment).
- Adjust the parking brake cable if necessary (see Parking Brake Adjustment in the Brakes chapter).

### *Steering Knuckle Removal*

- Remove the following parts.
  - Front Wheel
  - Front Hub
- Remove the cotter pin and tie-rod end nut from the steeing knuckle.

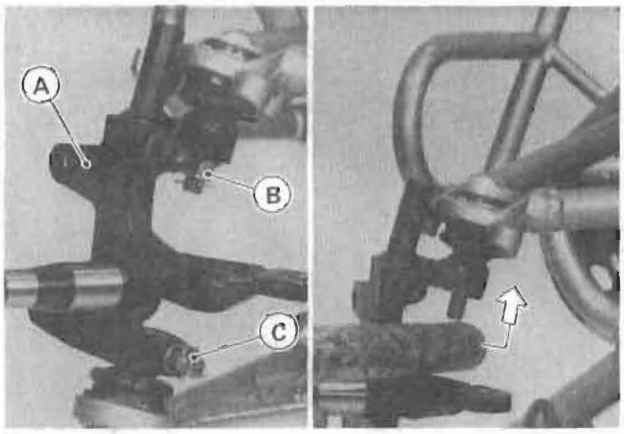
**CAUTION**

**Do not loosen the locknuts at the ends of the tie-rod adjusting sleeve, or the toe-in of the front wheels will be changed.**




A. Tie-Rod End Nut B. Adjusting Sleeve Locknut

- Remove the cotter pin and knuckle joint nut from the upper suspension arm, then pry the knuckle joint out.
- Remove the cotter pin, knuckle joint clamp nut and bolt.

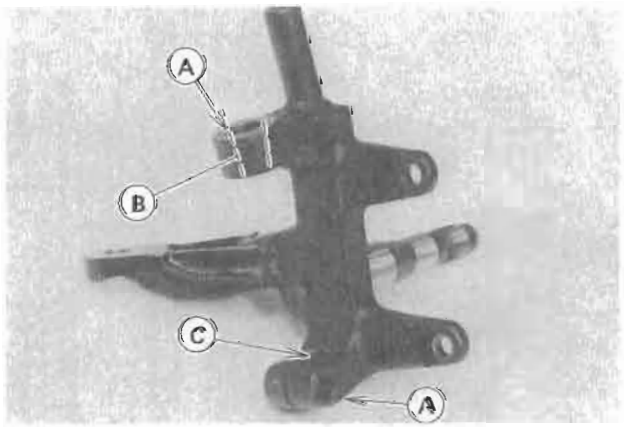



A. Steering Knuckle C. Knuckle Joint Clamp Nut
B. Knuckle Joint Nut

- Move the suspension arm up to remove the steering knuckle.
- Repeat the same procedure on the other side of vehicle.

### *Steering Knuckle Installation Notes*

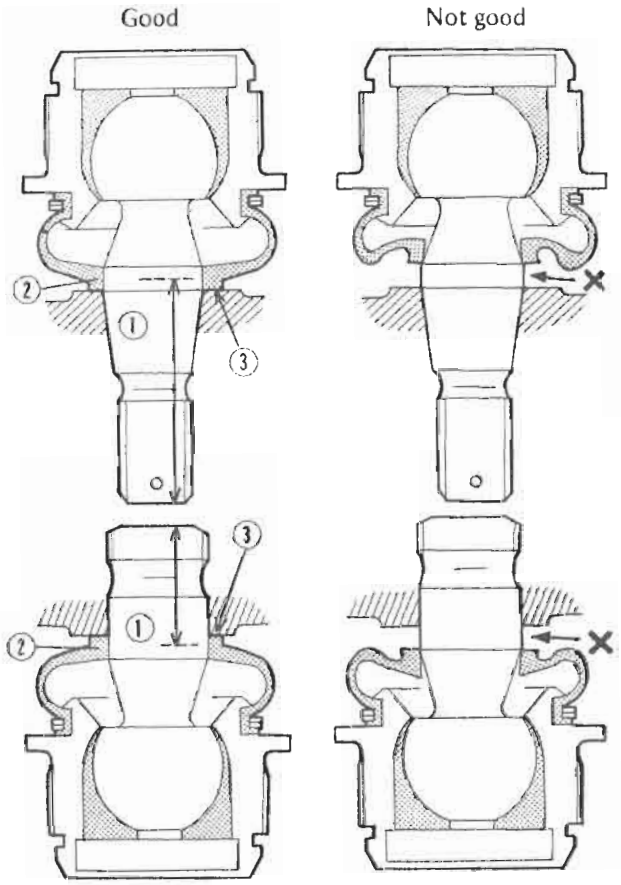
- The installation is the reverse of removal. Note the following.
- Clean the sealing surfaces, and the tapered hole and clearance hole in the knuckle.




A. Sealing Surfaces C. Clearance Hole
B. Tapered Hole

- Clean the shanks of the knuckle joint.
- Check that the grease seal does not have tear, wear, deterioration, or grease leaking.
- Check that the seal lip is on the sealing surface of the shanks as shown.
- Grease the seal lip.

### Knuckle Joint Installation

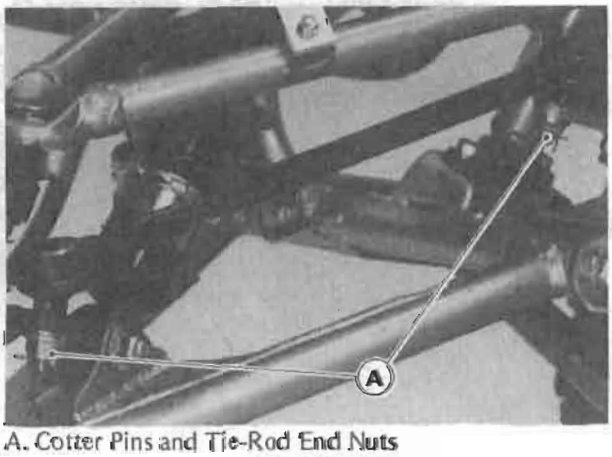



1. Shanks
2. Seal Lips
3. Grease here.

- Tighten the knuckle joint nut and knuckle clamp nut to the specified torque (see Exploded View).

### *Tie-Rod Removal*

- Remove the cotter pin and the tie-rod end nut at the steering knuckle.
- Remove the cotter pin and the tie-rod end nut at the steering stem.
- Pry off the tie-rod.



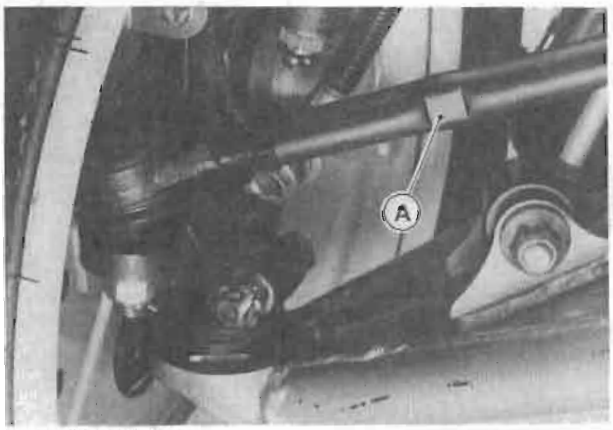

A. Cotter Pins and Tie-Rod End Nuts

**CAUTION**

**○When removing the tie-rod, be careful not to bend it.**
**○Do not loosen the locknuts at the end of the tie-rod adjusting sleeve, or the toe-in of the front wheels will be changed.**

### *Tie-Rod Installation Notes*

○The installation is the reverse of removal. Note the following.
○The right and left tie-rods are identical.
- Install the tie-rod with the flattened area located outboard.

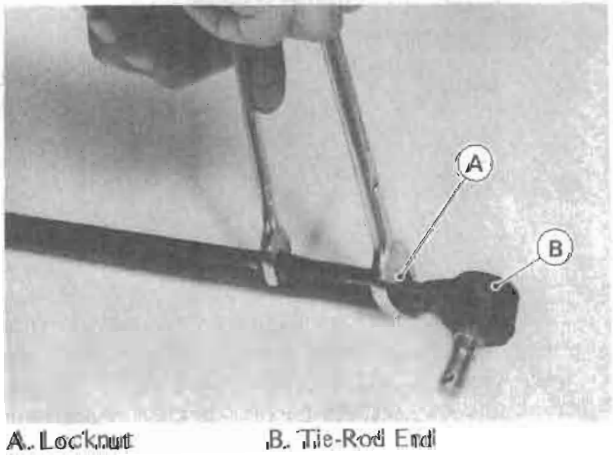



A. Flattened Area

- Tighten the tie-rod end nuts to the specified torque (see Exploded View).
- Inspect the toe-in if necessary (see Toe-in Inspection in Wheels/Tires chapter).

### *Tie-Rod End Removal*

- Remove the tie-rod.
- Holding the tie-rod flattened area, loosen the locknut and unscrew the tie-rod end.




A. Locknut B. Tie-Rod End

**NOTE**

○*The locknut on the opposite end of the tie-rod from the flattened area has left-hand threads. Turn the wrench clockwise for loosening.*

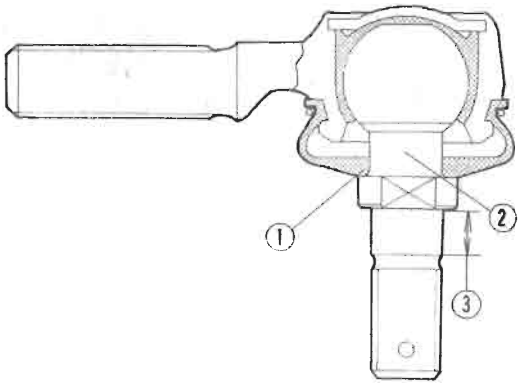
**CAUTION**

○**Do not remove the grease seal. It is packed with grease.**

### *Tie-Rod End Installation Notes*

●Check that the seal lip is on the shank.
●Apply oil to the bolt body.

**Tie-Rod End Installation**




1. Seal Lip
2. Shank
3. Apply oil.

## Steering Maintenance

### *Steering Inspection*

○Check the steering play in accordance with the Periodic Maintenance Chart.
●Turn the handlebar right and left, and check the steering action.
★If the steering action is not smooth, or if the steering binds or catches before the stop, lubricate the steering.

**NOTE**

○*The cables and wires will have some effect on the steering action which must be taken into account.*

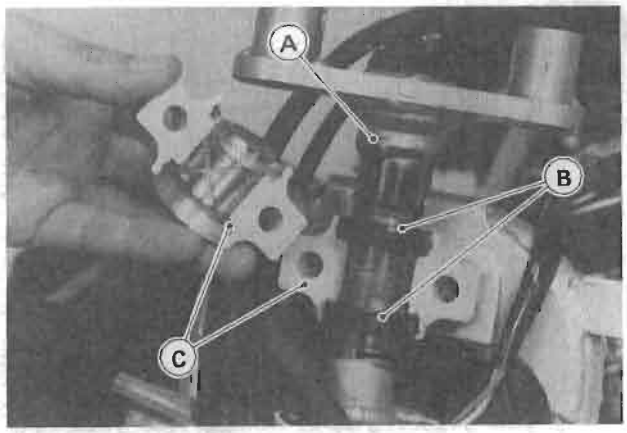
●Check the steering action again.
★If the steering lubrication does not remedy the problem, inspect the steering stem warp, steering stem clamps, and tie-rod end bearings.
★If you feel looseness, or if the steering rattles as it turns, check the tightness of the steering bolts and nuts.
●Tighten loose bolts and nuts to the specified torque (see Exploded View), and check the steering action again.
★If the steering action does not change by tightening the bolts and nuts, inspect the steering stem clamps, steering stem bearing, tie-rod end bearings, and steering knuckle joints.

### *Steering Stem Warp*

●Remove the steering stem.
●Check the steering stem for straightness.
○Use a straightedge along the stem.
★If the steering stem is bent, replace the steering stem.

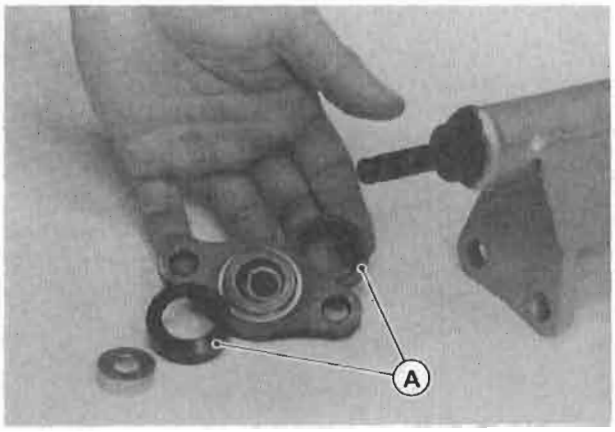
### *Steering Lubrication*

●Lubricate the steering stem clamps.
○Remove the steering stem.
○Wipe all the old grease off the steering stem, and clamps, and out of the grease seals.
○Apply molybdenum disulfide grease to the steering stem and pack the grease seal grooves between the lips with the grease.




A. Steering Stem
B. Grease Seals
C. Clamps

●Lubricate the steering stem bearing.
○Disassemble the steering stem bearing.
○Wipe all the old grease off the steering stem and out of bearing grease seal.
○Pack the grease seal groove between the lips with molybdenum disulfide grease.



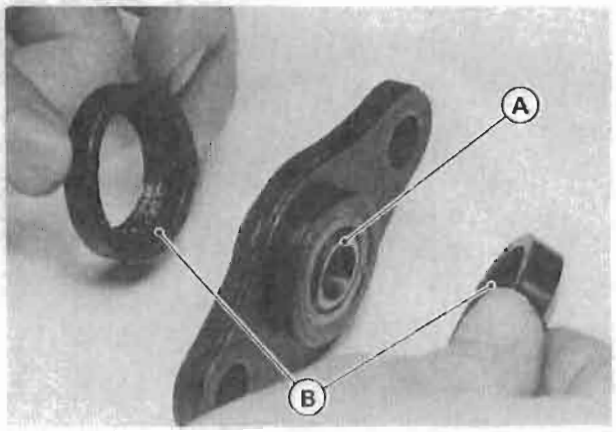

A. Grease Seals

### *Steering Stem Clamp Inspection*

●Inspect the steering stem clamps.
★If roughness, excessive play, or seizure is found, replace both clamps.

### *Steering Stem Bearing Inspection*

●Inspect the spherical bearing.
★If roughness, excessive play, or seizure is found, replace the steering stem bearing assembly.
●Inspect each grease seal.
★If damage, wear or deterioration is found, replace the steering stem bearing assembly.

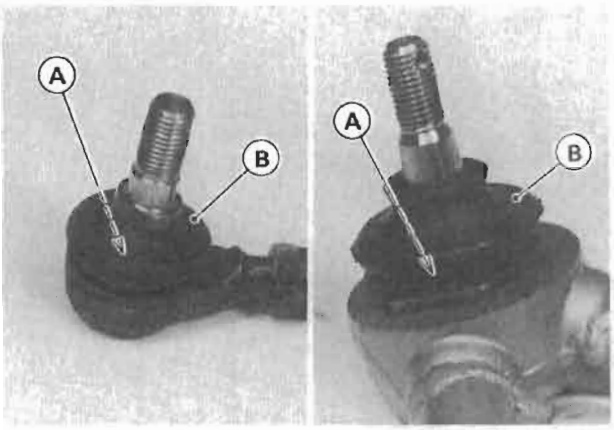



A. Spherical Bearing B. Grease Seals

### *Tie-Rod End, or Steering Knuckle Joint Inspection*

●Inspect each spherical bearing.
★If roughness, excessive play, or seizure is found, replace the tie-rod end, or steering knuckle joint.
●Inspect each grease seal.
★If tear, wear, deterioration, or grease leaking is found, replace the tie-rod end, or steering knuckle joint.

**Tie-Rod End** **Knuckle Joint**

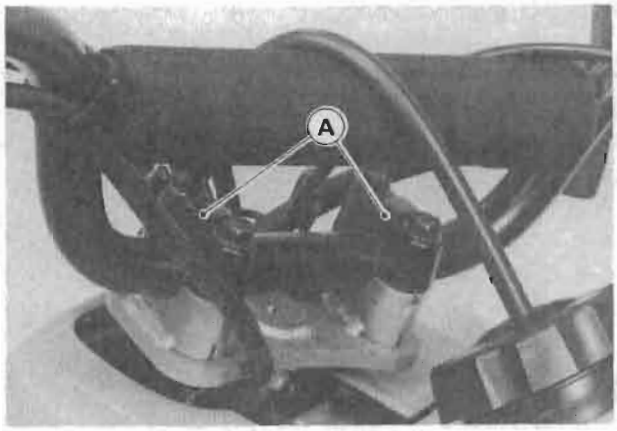



A. Spherical Bearing B. Grease Seal

## Handlebar

### *Handlebar Removal*

●Remove the following parts from the handlebar.
Left-Hand Switch Housing
Clutch Lever
Throttle Case
Front Brake Master Cylinder
●Remove the handlebar holder bolts and lift off the handlebar.

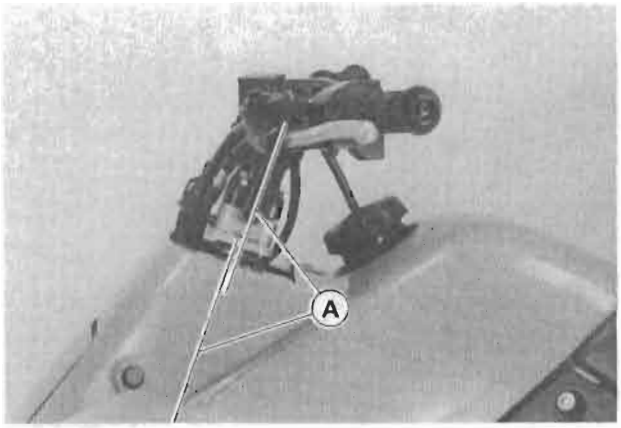



A. Handlebar Holders

*Handlebar Installation*

○Handlebar installation is the reverse of removal. Note the following.

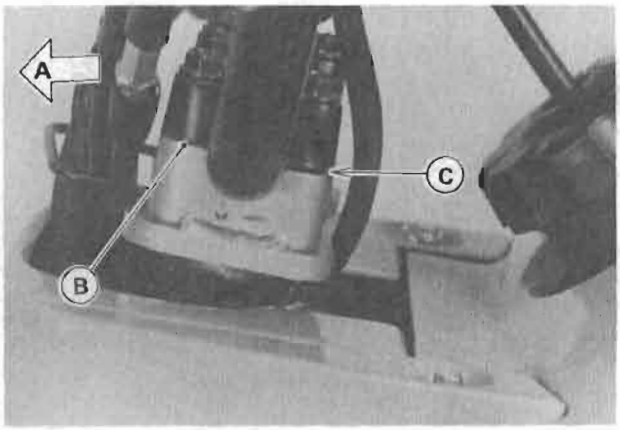
●Install the handlebar so that the angle of the handlebar matches the angle of the steering stem as shown.




A. Parallel

●Tighten the holder front bolts first and then the rear bolts.

○If the holder is correctly installed, there will be no gap at the front and an even gap at the rear after tightening.

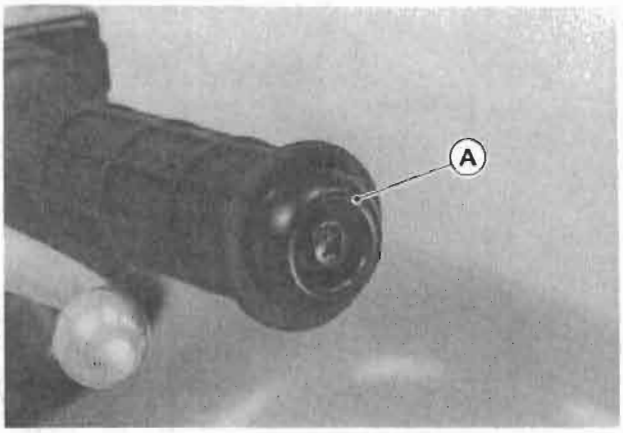



A. Front
B. No Gap
C. Gap

●Route the cables, the brake hose, and the wire harness according to the Cable and Harness Routing section in the General Information chapter.

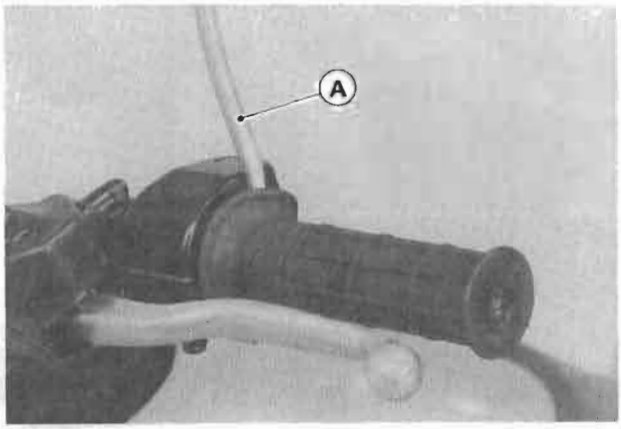
*Handlebar Grip Removal*

●Remove the screw and take off the plug.




A. Plug

●Slide a thin drift between the grip and the handlebar.




A. Drift

●Apply a small amount of Kawasaki Electric Contact Cleaner or equivalent into the opening next to the drift.

●Pull the drive out, and quickly slide the grip off the handlebar. Twist the grip as you pull.

*Handlebar Grip Installation*

●Apply adhesive to the inside of the grip. The adhesive should be the one recommended by the manufacturer for bonding rubber to metal.

●Slide the grip into position on the handlebar.

# Frame

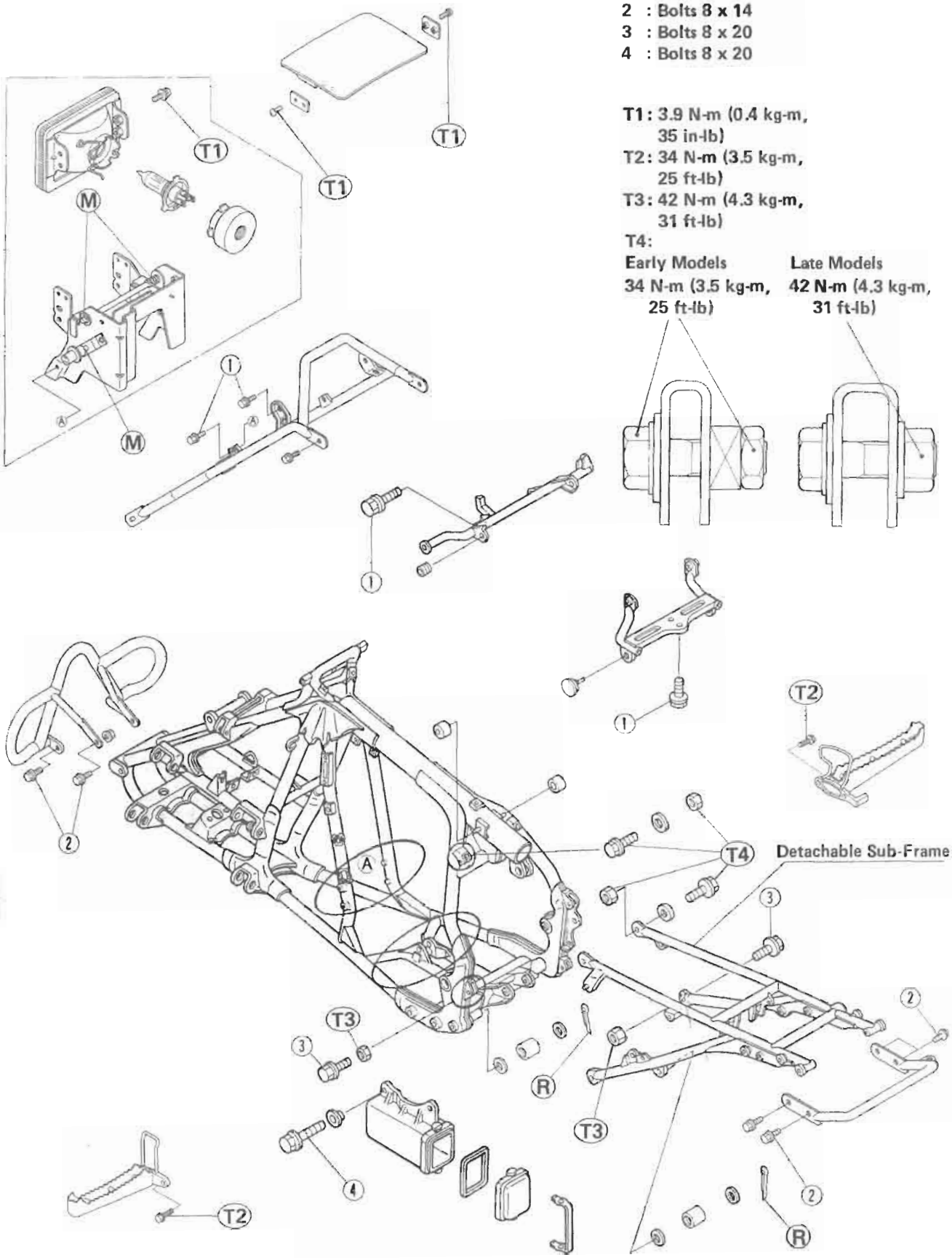
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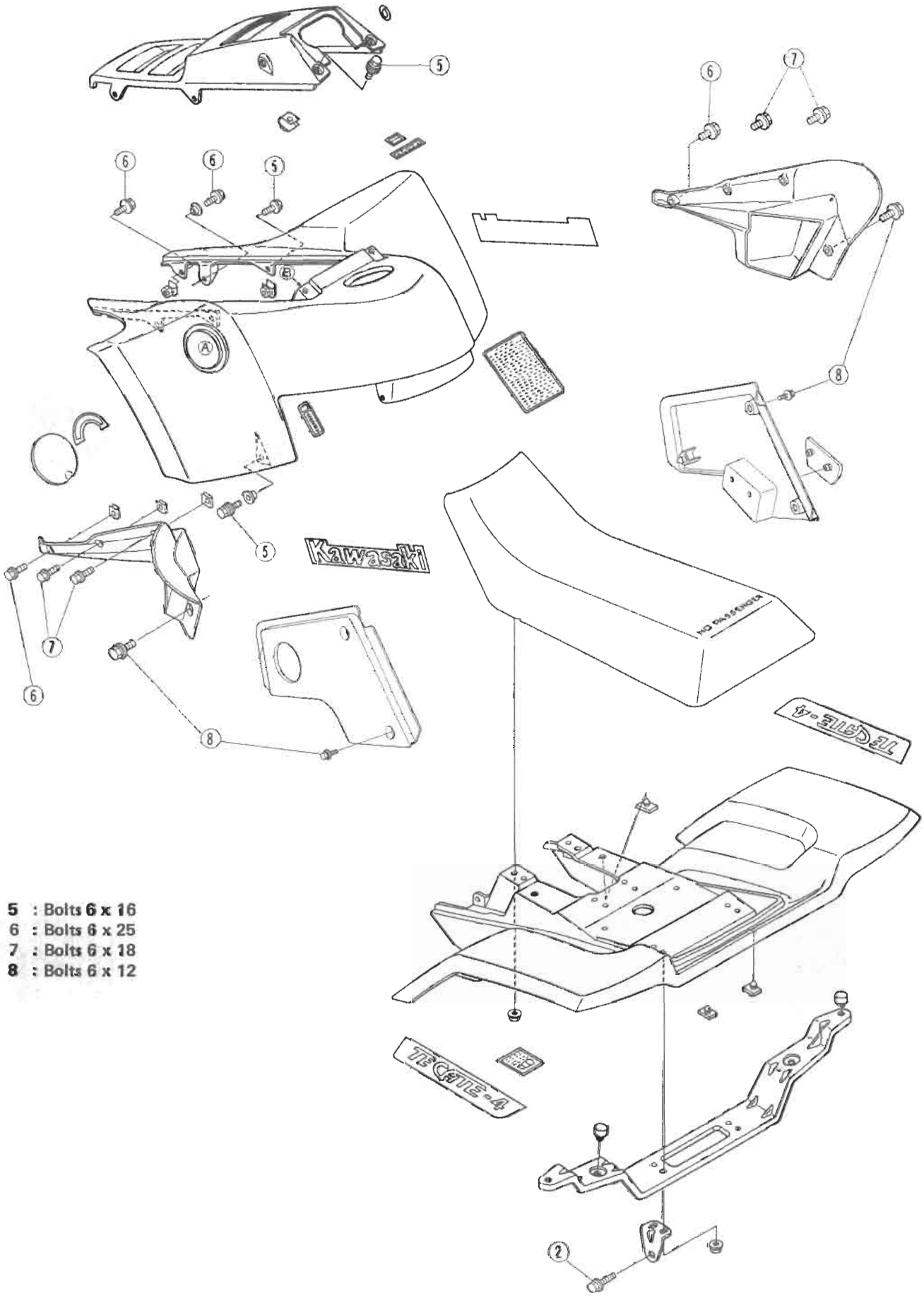

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## Exploded View

M : Apply molybdenum disulfide grease.
R : Replacement Parts
1 : Bolts 6 x 10
2 : Bolts 8 x 14
3 : Bolts 8 x 20
4 : Bolts 8 x 20

T1: 3.9 N-m (0.4 kg-m, 35 in-lb)
T2: 34 N-m (3.5 kg-m, 25 ft-lb)
T3: 42 N-m (4.3 kg-m, 31 ft-lb)
T4:
Early Models 34 N-m (3.5 kg-m, 25 ft-lb)
Late Models 42 N-m (4.3 kg-m, 31 ft-lb)



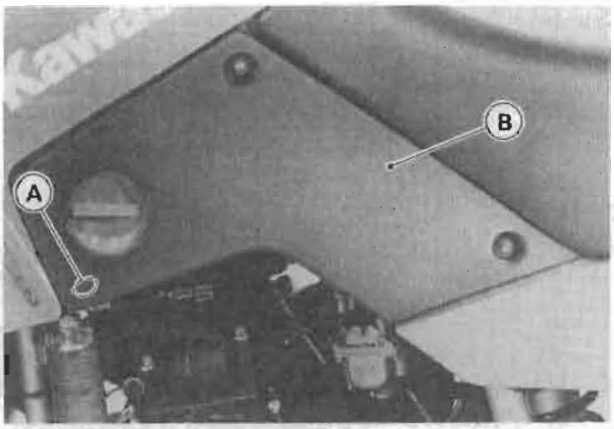



**5** : Bolts **6 x 16**
**6** : Bolts 6 x 25
**7** : Bolts 6 x 18
**8** : Bolts 6 x 12

## Side Cover

### *Side Cover Removal*

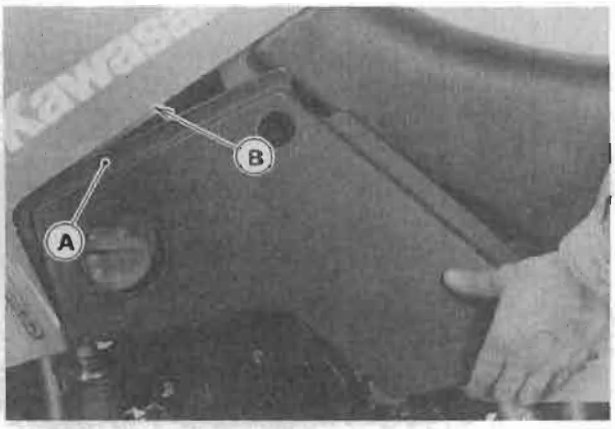
- Remove the side cover mounting bolts.
- Pull the cover outward to clear the stopper and take off the cover.




A. Stopper B. Side Cover

### *Side Cover Installation Note*

- Fit the side cover tab into the gap in the front fender.

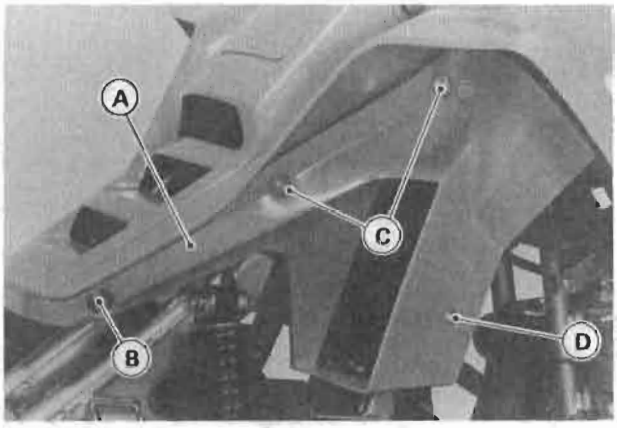



A. Tab B. Gap

## Front Fenders

### *Air Scoop Removal*

- Remove the following bolts.
- Take off the air scoop.

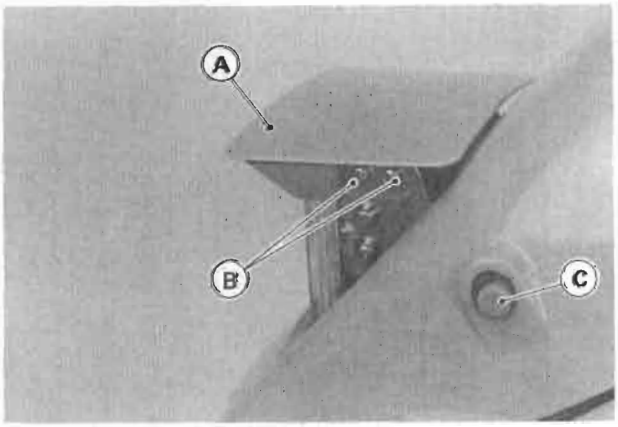



A. Air Scoop
B. Bolt 6 x 25
C. Bolt 6 x 18
D. Bolt 6 x 12

- Remove the other side of the air scoop in the same manner.

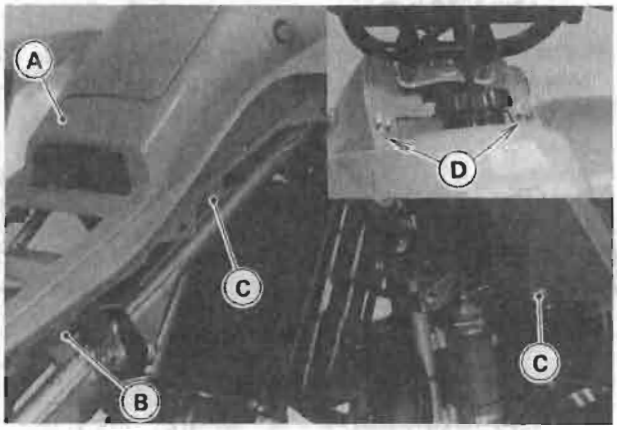
### *Front Fender Cover Removal*

- Remove the air scoops (see Air Scoop Removal).
- Push the headlight button to raise the headlight unit.
- Take off the headlight cover by removing the mounting screws.



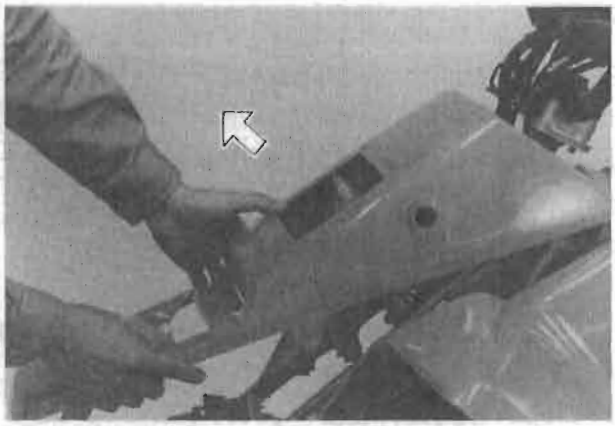

A. Headlight Cover
B. Mounting Screws
C. Headlight Button

●Remove the following bolts and flanged collars.




A. Front Fender Cover
B. Flanged Collar, Bolt 6 x 25
C. Flanged Collar, Bolt 6 x 16
D. Bolt 6 x 16

●Lift up the front fender cover.
○Pull off the ignition switch lead connectors to complete the cover removal.



### *Front Fender Removal*

●Remove the following parts.
Side Covers
Front Fender Cover
●Remove the tank cap.

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

●Bend the front fender tabs outward to clear the stoppers on the fuel tank bracket.
●Move the front fender backward and remove it.




A. Stopper B. Front Fender Tab

●Install the tank cap at one.

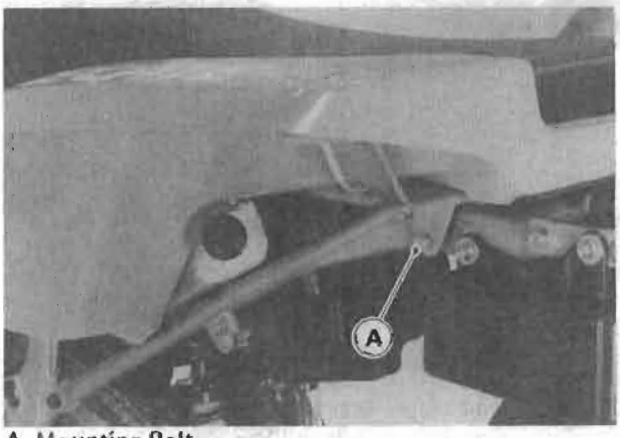
### *Air Scoop, Front Fender Cover and Front Fender Installation Notes*

○Installation is the reverse of removal. Note the following.
●Fit the front fender cover tab into the slit in the front fender.
●Install the mounting screws, bolts, nuts, flanged collars, and washers in the original positions (see Exploded View).

## Rear Fender

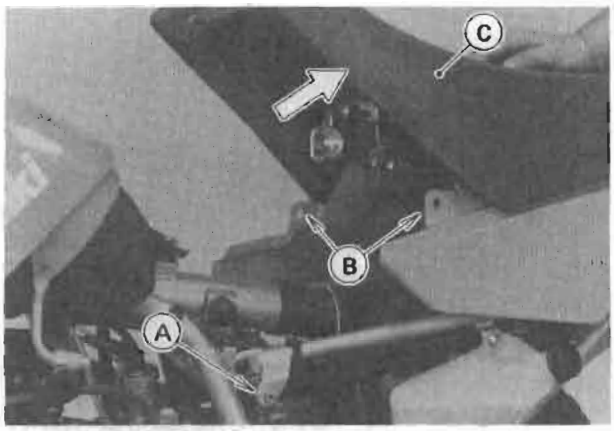
### *Rear Fender and Seat Removal*

●Remove the side covers (see Side Cover Removal).
●Remove the rear fender mounting bolts.




A. Mounting Bolt

- Bend the rear fender tabs outward to clear the stoppers on the frame.
- Move the rear fender and seat backward and remove them.

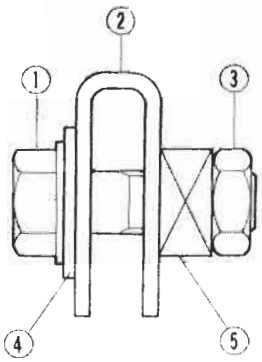



A. Stopper
B. Rear Fender Tab
C. Rear Fender and Seat

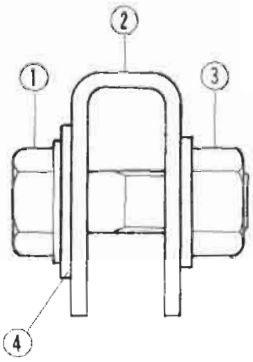
- Tighten the lower mounting bolts and nuts to **42 N·m (4.3 kg-m, 31 ft-lb)** of torque.
- Remove the rear fender in order to tighten the upper bolts and nuts.
- On early models, tighten the upper bolts and nuts to **34 N·m (3.5 kg-m, 25 ft-lb)** of torque and on late models to **42 N·m (4.3 kg-m, 31 ft-lb)** of torque.

**Upper Mounting Bolts and Nuts**

**Early Models (F/No. Range: up to 500915)**




**Late Models (F/No. Range: 500916 ~)**

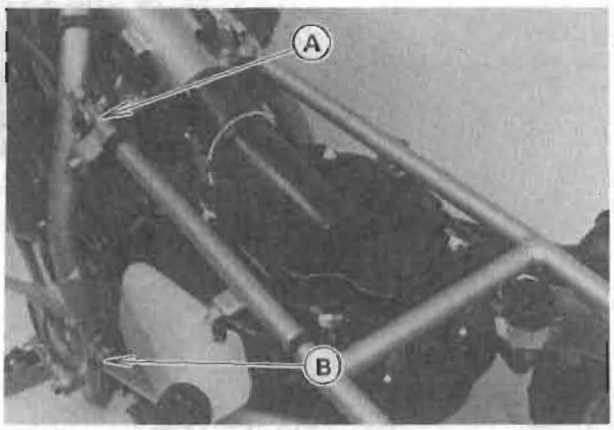



1. Bolt
2. Frame
3. Nut
4. Washer
5. Weld Nut

## Rear Frame

### *Rear Frame Bolts and Nuts Tightness Inspection*

- Tighten the rear frame bolts and nuts to the specified torque according to the Periodic Maintenance Chart (see General Information chapter) as follows.



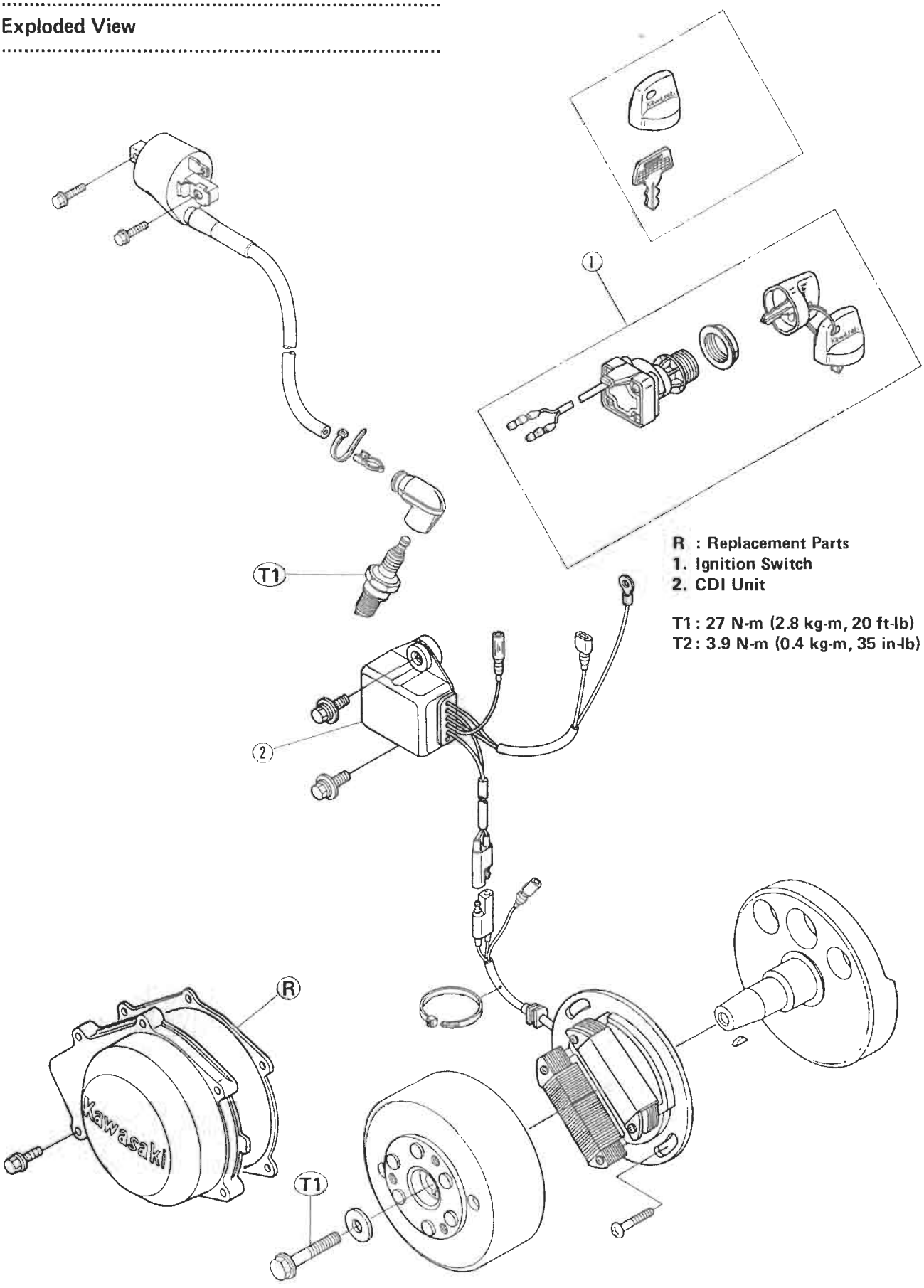

A. Rear Frame Upper Bolt and Nut
B. Rear Frame Lower Bolt and Nut

# Electrical System

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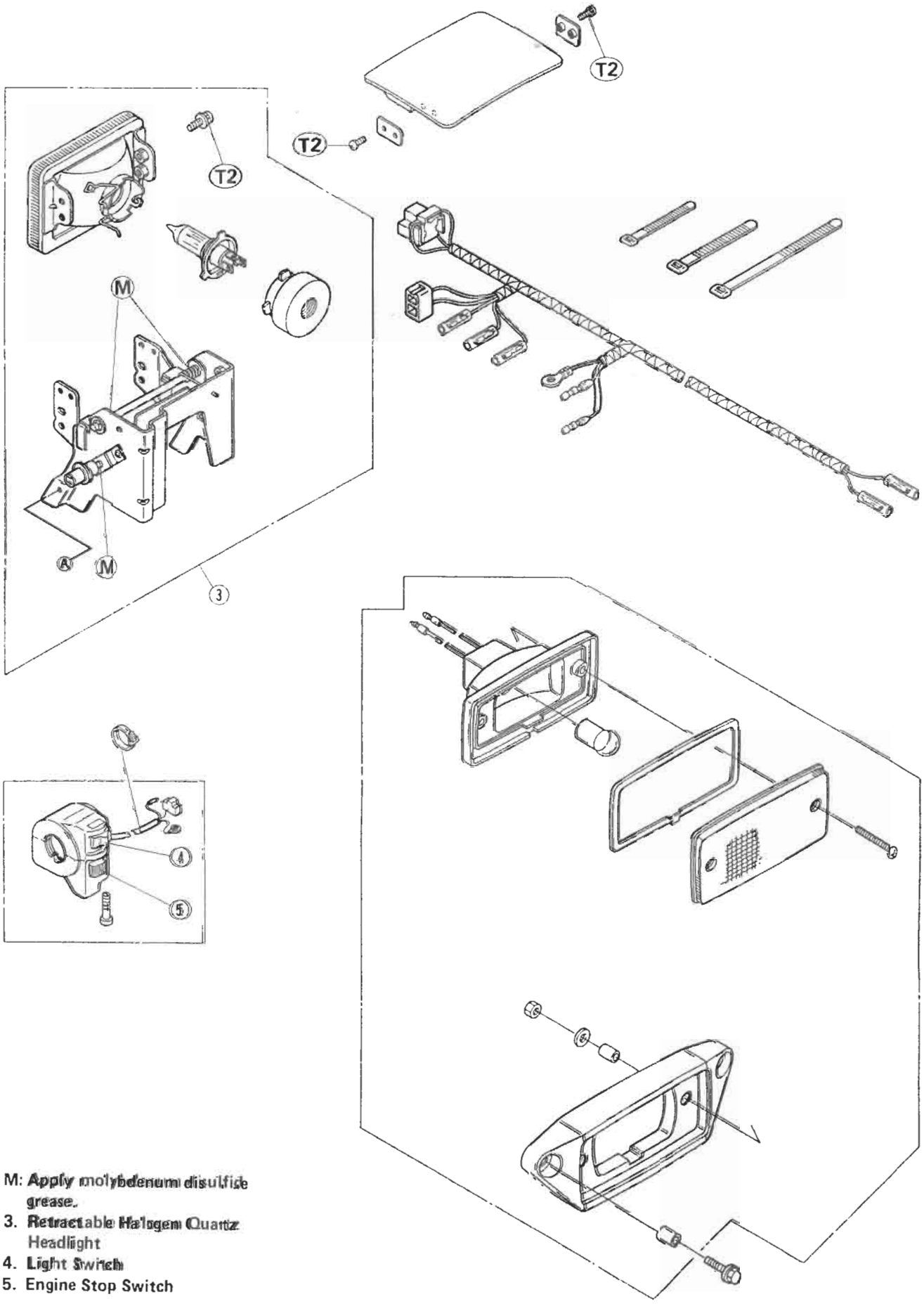

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## Exploded View




R : Replacement Parts
1. Ignition Switch
2. CDI Unit

T1 : 27 N-m (2.8 kg-m, 20 ft-lb)
T2 : 3.9 N-m (0.4 kg-m, 35 in-lb)




M: Apply molybdenum disulfide grease.
3. Retractable Halogen Quartz Headlight
4. Light Switch
5. Engine Stop Switch

## Specifications

**Ignition System**

| | |
|---|---|
| Spark plug gap: | 0.7 – 0.8 mm |
| Ignition timing: | 18° BTDC @6,000 r/min (rpm) |
| Ignition coil resistance | |
| Primary winding: | 0.25 – 0.35 Ω |
| Secondary winding: | 5 – 7.5 kΩ |
| Exciter coil resistance: | 50 – 75 Ω |
| CDI unit resistance: | in the text. |

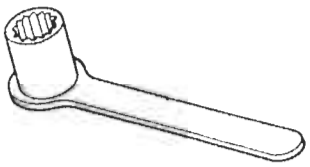
**Lighting System**

| | |
|---|---|
| AC lighting voltage: | 10.2 V or more @2500 r/min (rpm) (with headlight ON) |
| Lighting coil resistance: | 0.4 – 0.7 Ω |

## Special Tools

Along with common hand tools, the following more specialized tools are required for complete electrical system servicing.

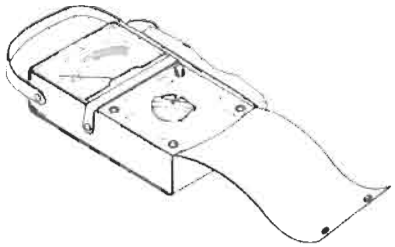
**Spark Plug Wrench: 92110-1126A (Owner's tool)**



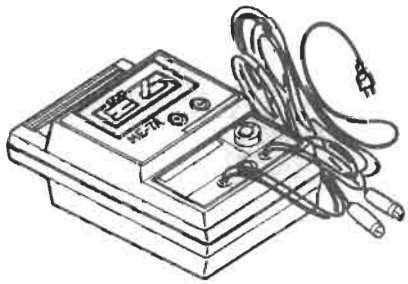
**Timing Light: 57001-1241**



**Hand Tester: 57001-983**



**Coil Tester: 57001-1242**



## Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

○The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.

○Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.

○Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.

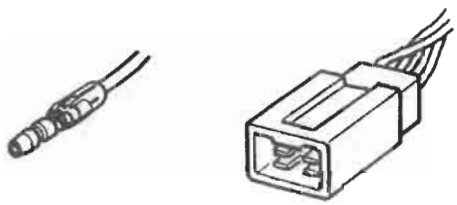
○Measure coil and winding resistance when the the part is cold (at room temperature).

○Electrical connectors are labeled as follows.

**Female Connectors**



**Male Connectors**



○Color Codes:

| | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| CH | Chocolate |
| DG | Dark green |
| G | Green |
| GY | Gray |
| LB | Light blue |
| LG | Light green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| W | White |
| Y | Yellow |

## Magneto Flywheel

### *Magneto Flywheel Removal*

●Refer to the Engine Left Side chapter.

### *Magneto Flywheel Installation*

●Refer to the Engine Left Side chapter.

## Ignition System

### *Safety Instruction*

**WARNING**

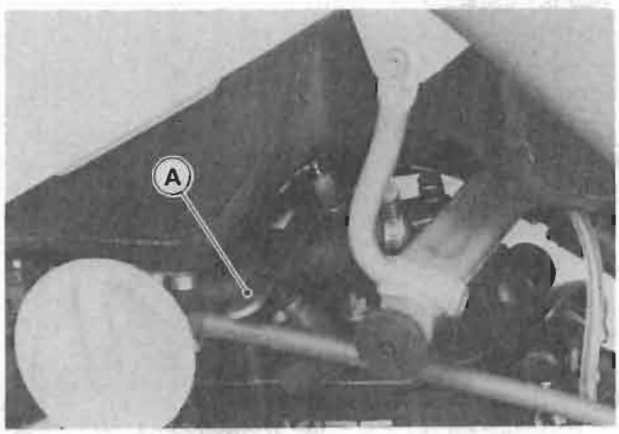
○**The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil body, or spark plug lead while the engine is running, or you could receive a severe electrical shock.**

### *Spark Plug Removal and Installation*

●Remove the following parts.
Left Side Cover (see Frame chapter)
Spark Plug Cap

●Remove or install the spark plug using the spark plug wrench (special tool, or owner's tool) as shown.

●Tighten the spark plug to the specified torque (see Exploded View).




A. Spark Plug Wrench: 92110-1126A

### *Spark Plug Cleaning and Inspection*

- Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using high-flash point solvent and a wire brush or other suitable tool. If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard spark plug or its equivalent.

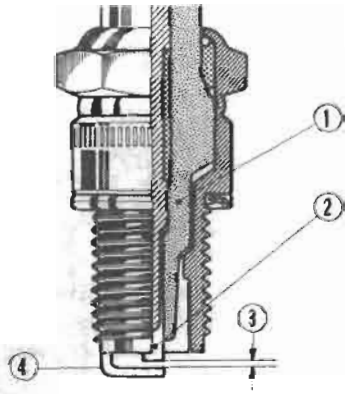
### *Spark Plug Gap*

- Measure the gap with a wire-type thickness gauge. If the gap is incorrect, carefully bend the outer electrode with a suitable tool to obtain the correct gap.

**Spark Plug Gap**

**0.7 – 0.8 mm**

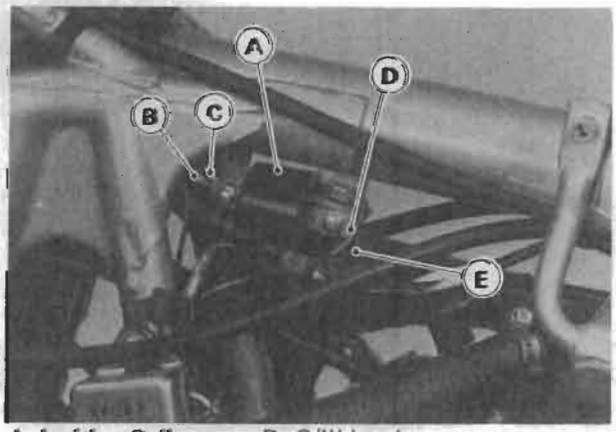
**Spark Plug Gap**




1. Insulator
2. Center Electrode
3. Plug Gap
4. Side Electrode

### *Ignition Coil Removal*

- Remove the following parts.
  - Fuel Tank (see Fuel System chapter)
  - Spark Plug Cap
- Remove the ignition coil by removing the mounting bolts and the leads.




A. Ignition Coil
B. BK Lead
C. BK/Y Lead
D. G/W Lead
E. BK Lead

### *Ignition Timing Inspection*

This model has a Capacitor Discharge Ignition (CDI) system. Since the CDI system has no mechanical parts such as a cam or contact breakers, **no periodic maintenance is required.**

- Remove the magneto cover.
- Connect the timing light (special tool) in the manner prescribed by the manufacturer in order to check the ignition timing under operating conditions.

**WARNING**

**Make sure that no tools, clothes, or leads ever touch the spinning flywheel. Touching the flywheel of a running engine could cause an injury.**

- Start the engine, and direct the light at the timing marks on the flywheel and crankcase. The center mark on the flywheel should align with the crankcase mark at 6,000 rpm.

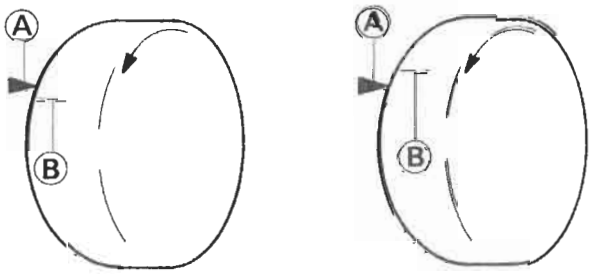
**Ignition Timing**

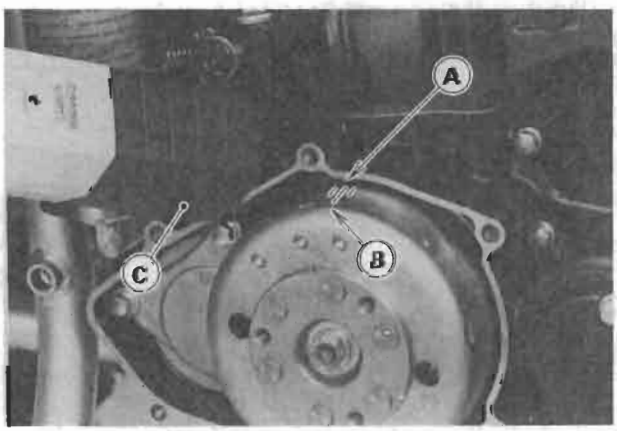
**18° BTDC @6,000 r/min (rpm)**

**Dynamic Ignition Timing**

1. Plug Fires Late
2. Plug Fires Early

**Retarded** **Advanced**



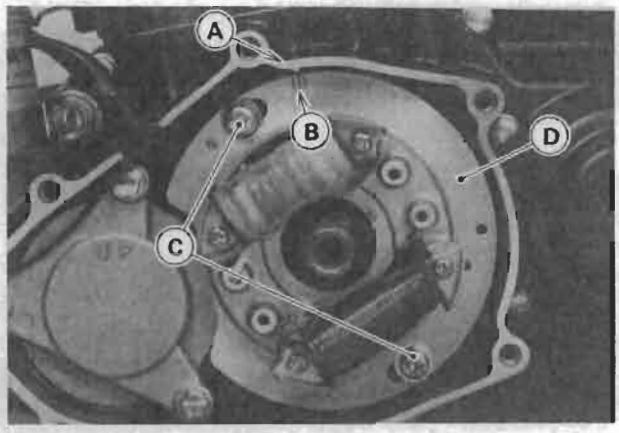




A. Crankcase Mark
B. Center Mark
C. Timing Light: 57001-1241

★If the ignition timing is suspect, check the timing marks first (see Ignition Timing Adjustment).
★If the timing marks are good, check the CDI unit (see CDI Unit Inspection).

### *Ignition Timing Adjustment*

Because a Capacitor Discharge Ignition (CDI) system is used on this vehicle, the ignition timing should never require adjustment unless the magneto stator is incorrectly installed during engine reassembly. However, if there is any doubt as to the timing, inspect and adjust as follows:
●Remove the magneto cover and the magneto.
●Check to see if the center mark of the three marks on the magneto stator is aligned with the mark on the crankcase.
★If the marks are not aligned, loosen the two magneto stator screws and move the magneto stator to align the center mark.




A. Timing Mark (Crankcase)
B. Center Timing Mark
C. Screws
D. Magneto Stator

●Tighten the screws securely.
●Install the magneto and the magneto cover.

### *Ignition Coil Arcing Distance Measurement*

●Measure the arcing distance with a Kawasaki coil tester (special tool: PN 57001-1242) to check the condition of the ignition coil.

**NOTE**

○***Since a tester other than the Kawasaki coil tester may produce a different arcing distance, the Kawasaki coil tester is recommended for reliable results.***

●Connect the ignition coil (with the spark plug cap left installed at the end of the spark plug lead) to the tester in the manner prescribed by the manufacturer and measure the arcing distance.

**Ignition Coil Arcing Distance**

**6 mm or more**

**WARNING**

○**To avoid extremely high voltage shocks, do not touch the ignition coil body or leads.**

★If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.
●To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil.
★If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.

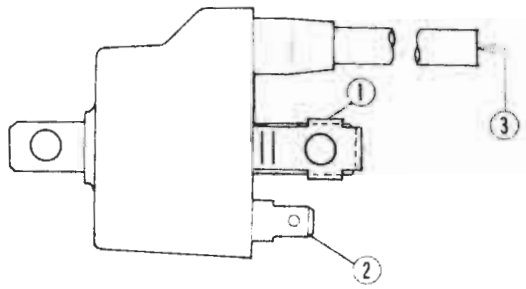
### *Ignition Coil Resistance Inspection*

The coil can be checked for a broken or badly shorted winding with the hand tester (special tool: PN 57001-983). However, the tester cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.
●Remove the fuel tank (see Fuel System chapter).
●Disconnect all the ignition coil leads and pull the spark plug cap off the spark plug.
●Connect the hand tester as shown. "Zero" the meter before using it.
●Measure the primary winding resistance.
○Connect the hand tester between the coil terminals.
○Set the tester to the x 1 Ω range, and read the meter.
●Measure the secondary winding resistance.
○Pull the spark plug cap off the lead.
○Connect the hand tester between the spark plug lead and terminal.
○Set the tester to the x 1 kΩ range, and read the meter.

**Ignition Coil Winding Resistance**

| Range | Connection | Reading |
|---|---|---|
| x 1 Ω | ⊕ Terminal – ⊖ Terminal | 0.25 – 0.35 M (Primary) |
| x 1 kΩ | ⊕ Terminal – Plug lead | 5 – 7.5 kΩ (Secondary) |

**Measuring Ignition Coil Resistance**




1. ⊖ Terminal
2. ⊕ Terminal
3. Plug Lead

★If the tester does not read as specified, replace the coil.
★If the tester reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.
●Check the spark plug lead for visible damage.
★If the spark plug lead is damaged, replace the coil.

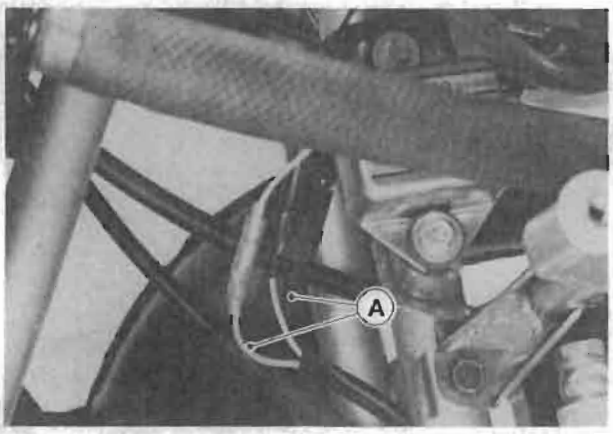
*Exciter Coil Resistance Inspection*

If the spark is weak or absent after the spark plug and ignition coil are found to be all functioning properly, and if the wiring is all in good condition and properly connected, the cause may be a short or open in the stator coil.

**WARNING**

○**To avoid burns, do not try to remove the stator connector when the exhaust pipe is still hot. Wait until it cools down.**

●Pull off the stator connector behind the exhaust pipe.
●Measure the exciter coil resistance using the hand tester (special tool) as follows.




A. Exciter Coil Leads (W/R and BK)

**Exciter Coil Resistance**

| | |
|---|---|
| **Range:** | **x 1 Ω** |
| **W/R – BK:** | **50 – 75 Ω** |

★If the tester does not read as specified, replace the magneto stator.
★If the coil has normal resistance, but the spark is weak or absent, the flywheel magnets have probably weakened. Replace the flywheel.

*CDI Unit Removal*

●Remove the following parts.
Fuel Tank (see Fuel System chapter)
CDI Lead Connectors
CDI Mounting Bolts
●Remove the CDI unit.

*CDI Unit Inspection*

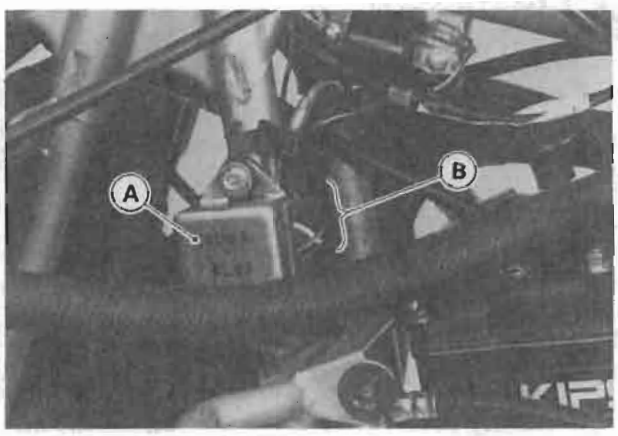
**CAUTION**

○**Use only a small portable type of multimeter for this test. If a megger or a meter with a large capacity battery is used, the CDI unit may be damaged.**

**NOTE**

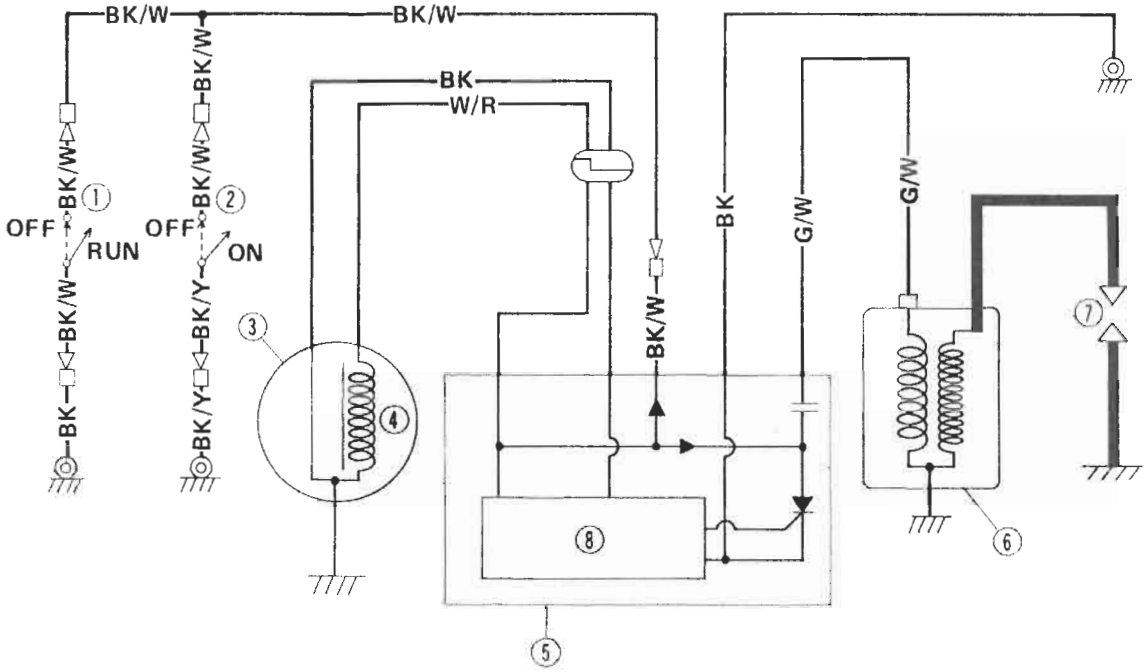
○*Since a tester other than the Kawasaki hand tester may show different readings, the Kawasaki hand tester is recommended for reliable results.*

●Remove the fuel tank (see Fuel System chapter).
●Pull off all the CDI lead connectors.




A. CDI Unit B. CDI Unit Leads

**Ignition System Circuit**




1. Engine Stop Switch
2. Ignition Switch
3. Magneto
4. Exciter Coil
5. CDI Unit
6. Ignition Coil
7. Spark Plug
8. Trigger Circuit

●Set the hand tester (special tool: PN 57001-983) to the x 1kΩ range and make the measurements shown in the table.

**CDI Unit Resistance** **Unit : kΩ**

| Range x 1 kΩ | | Tester Positive (+) Lead Connection | | | |
|---|---|---|---|---|---|
| Tester Negative (−) Lead Connection | Lead Color | BK (2) | W/R | BK/W | G/W |
| | BK (2) | | 2.3 – 3.5 | 7.0 – 10.6 | 0* |
| | W/R | ≒ 0 | | 2.2 – 3.2 | 0* |
| | BK/W | ∞ | ∞ | | ∞ |
| | G/W | 2.3 – 3.5 | 7.3 – 10.9 | 24.0 – 36.0 | |

* : Meter hand deflects and returns.

★If the meter readings do not correspond to the table, replace the CDI unit.

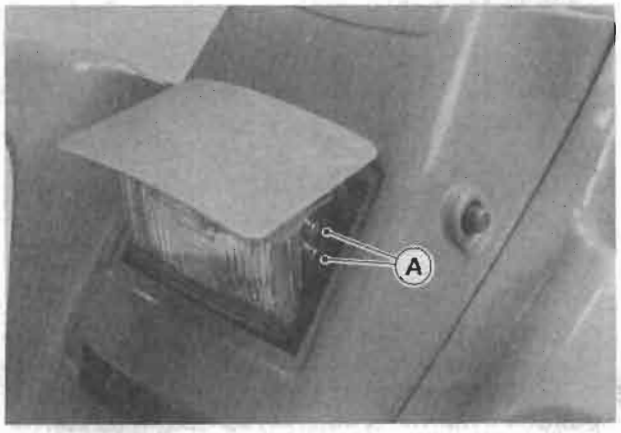
## Lighting System

### *Headlight Beam Vertical Adjustment*

The headlight beam is adjustable vertically only.

●Raise the headlight unit by pushing the headlight button.

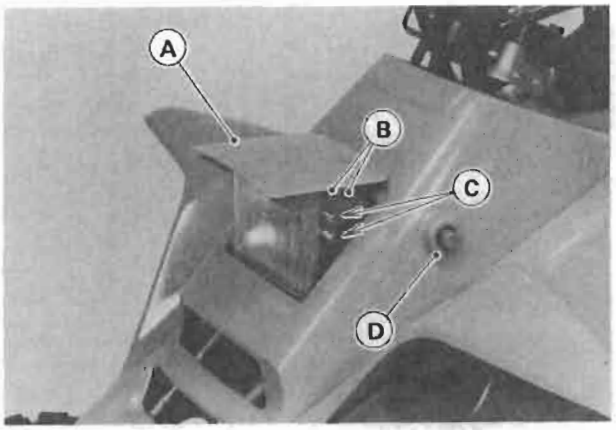
●Loosen the mounting screws on both sides and tilt the headlight unit by hand for vertical adjustment.




A. Headlight Unit Mounting Screws

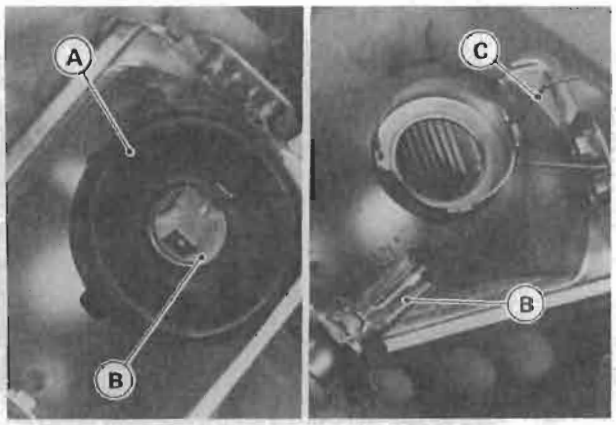
### *Headlight Bulb Replacement*

- Push the headlight button to raise the headlight unit.
- Take off the headlight cover by removing the cover mounting screws.
- Remove the headlight unit by removing the unit mounting screws.




A. Headlight Cover
B. Cover Mounting Screws
C. Unit Mounting Screws
D. Headlight Button

- Slide back the dust cover.
- Remove the clip and pull the bulb out of the headlight unit.

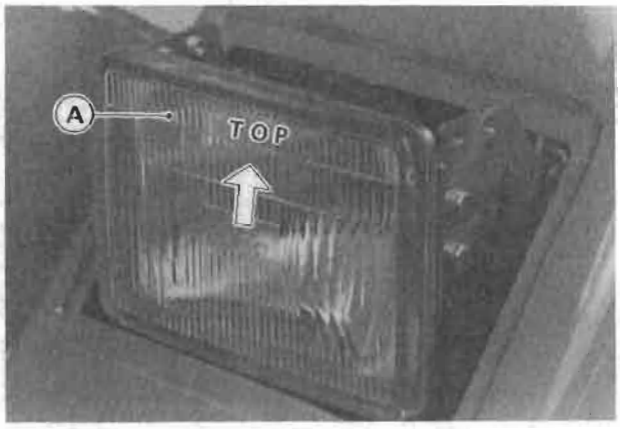



A. Dust Cover
B. Bulb
C. Clip

**CAUTION**

**When handling the quartzhalogen bulbs, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.**

- Be sure the socket is clean.
- Push the new bulb in.
- Lock the clip.
- Slide back the dust cover completely.
- Install the headlight unit so that the "TOP" mark on the lens points up.

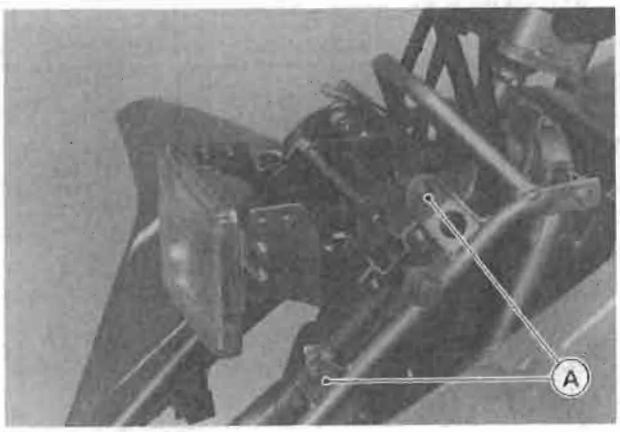



A. "TOP" Mark

- Check the headlight aiming after installation.

### *Headlight Bracket Removal*

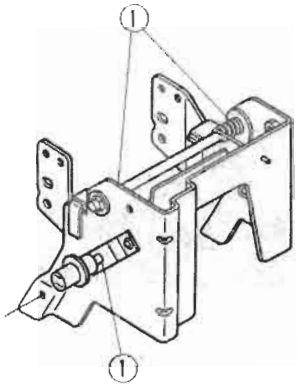
- Remove the headlight unit (see Headlight Bulb Replacement).
- Remove the front fender cover (see Front Fender Cover Removal in the Frame chapter).
- Remove the headlight bracket by removing the mounting bolts.




A. Bracket Mounting Bolts

### *Headlight Bracket Installation Note*

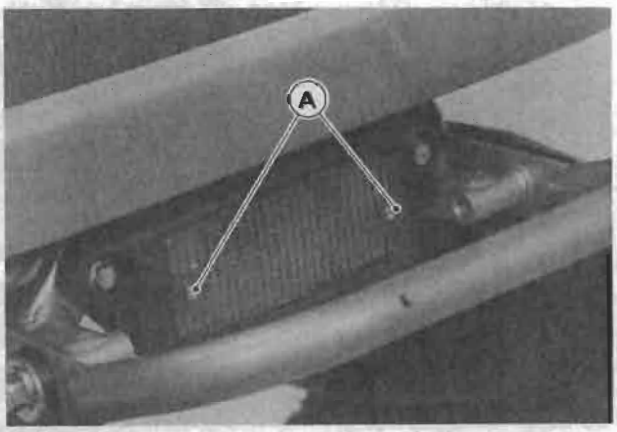
- Apply molybdenum disulfide grease to the sliding points shown.




1. Grease here.

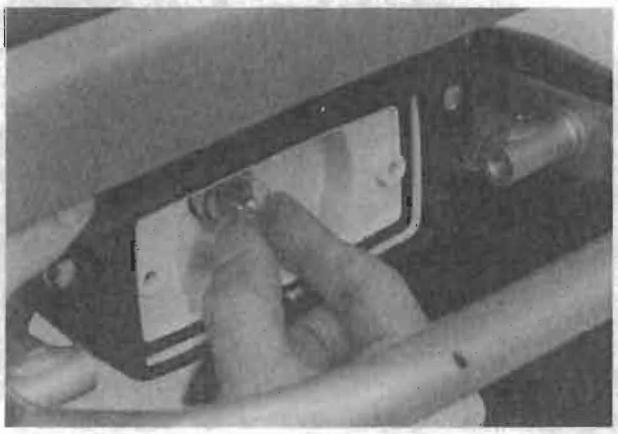
### *Taillight Bulb Replacement*

- Take out the screws in the taillight lens. The taillight drops off the frame.

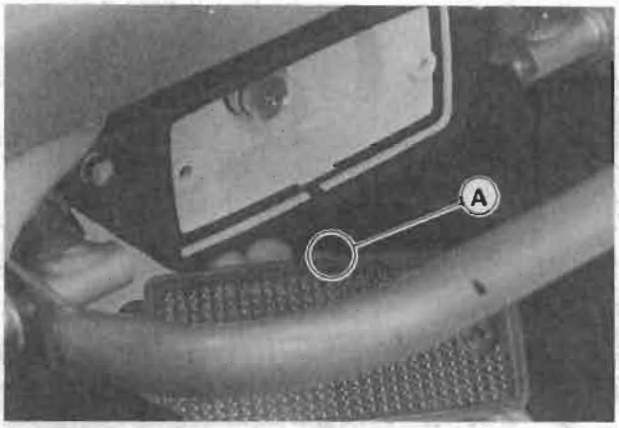



A. Screws

- Pull the lens off.
- Push the bulb in, turn it counterclockwise, and pull it out.



- Be sure the socket is clean.
- Insert the new bulb by aligning the pins with the grooves in the walls of the socket.
- Push the bulb in, turn it clockwise, and release it. It should lock in position.
- Check to see that the rubber gasket is in place, and put the lens in place so that the lens projection fits into the notch on the housing and points down.
- Put in the two screws. Be careful not to overtighten them.




A. Projection

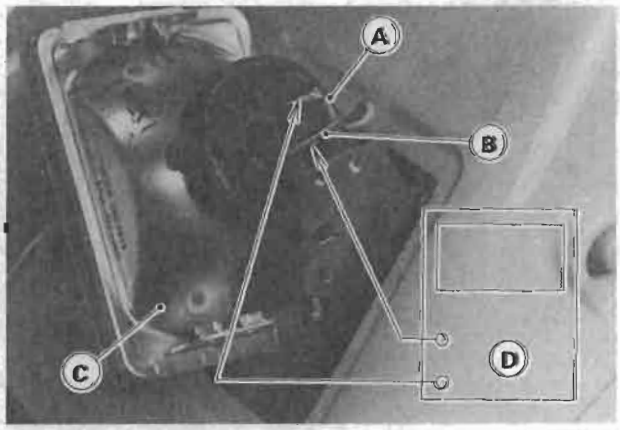
### *AC Lighting Voltage Measurement*

The condition of the lighting coil of magneto is determind by measuring the voltage of the AC output.

**NOTE**

○ *Perform test with headlight connected.*

- Take out the headlight unit with the headlight leads left installed.
- Connect the hand tester (special tool) as shown.
- Set the tester to the 25 V AC range.




A. R Lead
B. BK/Y Lead
C. Headlight Unit
D. Hand Tester: 57001-983

- Turn the light switch to the ON position and start the engine.
- See that the headlight and taillight are all lit.
- Measure the lighting voltage at **2,500 rpm.** The voltage should match the value in the table.
- ★If the reading is much lower than specified, check the lighting coil on the magneto stator.

**AC Lighting Voltage**

| | |
|---|---|
| **Range:** | **25 V AC** |
| **Connection:** | **R – BK/Y** |
| **Reading:** | **10.2 V or more @2,500 r/min (rpm)** |




A. Lighting Coil Leads (Y and BK)

*Lighting Coil Resistance Inspection*

**WARNING**

- **To avoid burns, do not remove the stator connector when the exhaust pipe is still hot. Wait until it cools down.**

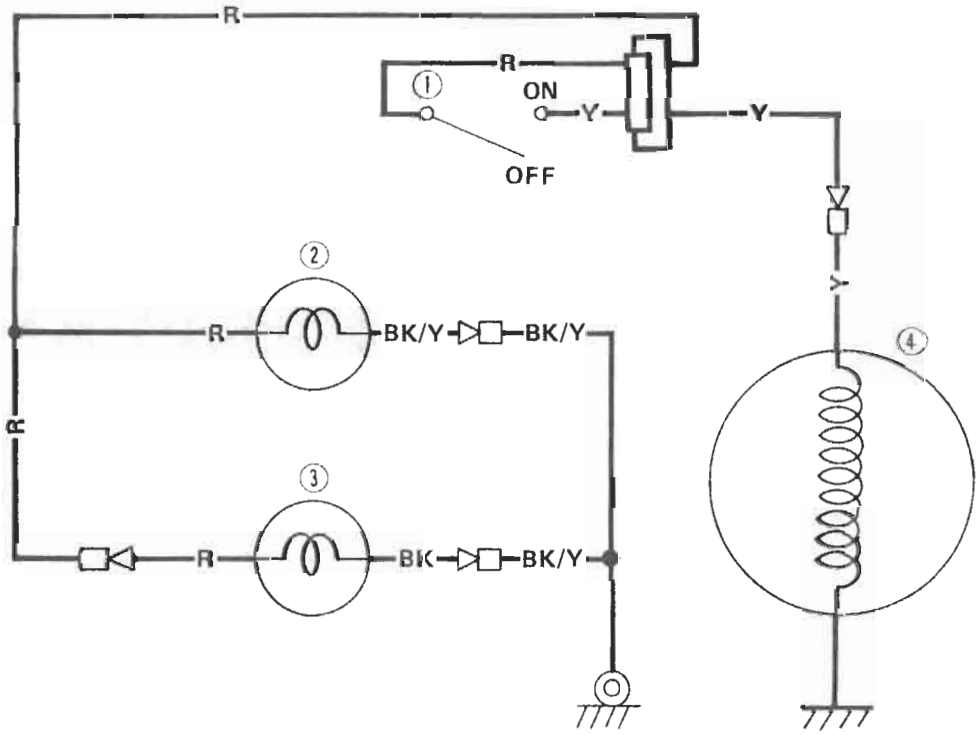
- Disconnect the stator connectors behind the exhaust pipe.
- Measure the lighting coil resistance using the hand tester (special tool: PN 57001-983).

**Lighting Coil Resistance**

| | |
|---|---|
| **Range:** | **x 1 Ω** |
| **Y – BK:** | **0.4 – 0.7 Ω** |

- ★If the tester does not read as specified, replace the magneto stator.
- ★If the coil has normal resistance, but the voltage inspection shows the magneto to be defective, the flywheel magnets have probably weakened. Replace the flywheel.

**Lighting Circuit**

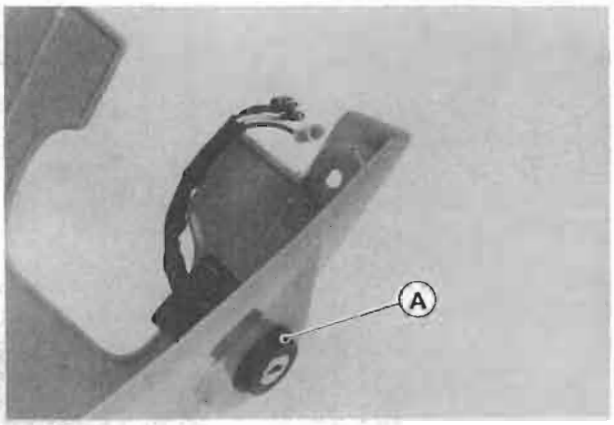



1. Light Switch
2. Headlight
3. Taillight
4. Magneto

## Switches

### *Ignition Switch Removal*

- Remove the front fender cover (see Frame chapter).
- Loosen the switch mounting nut and remove the ignition switch.

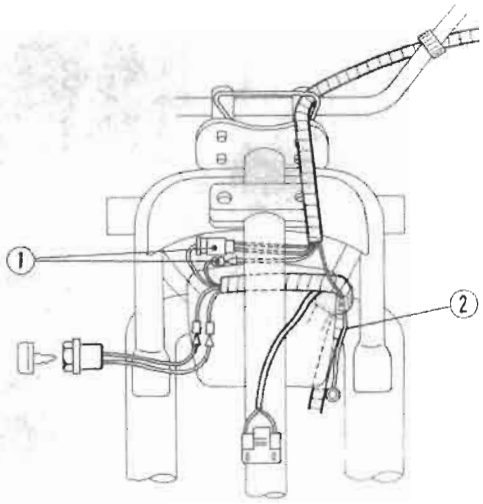



A. Ignition Switch Mounting Nut

### *Light Switch and Engine Stop Switch Removal*

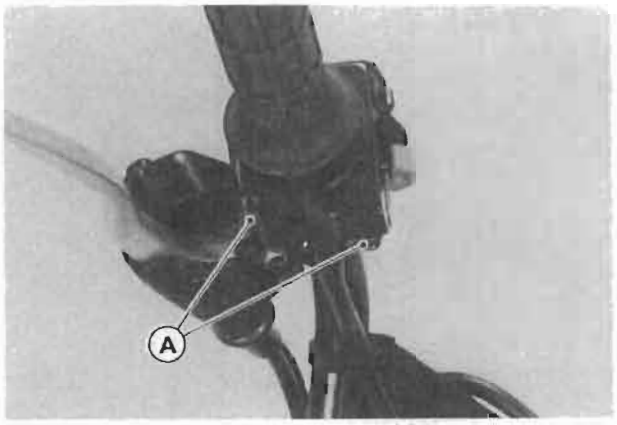
- Remove the front fender (see Frame chapter).
- Pull off the connectors and ground lead from the left-hand switch housing.

**Left Hand Switch Connector**




1. Connectors 2. Ground Lead

- Take out the screws holding the left-hand switch case halves together.



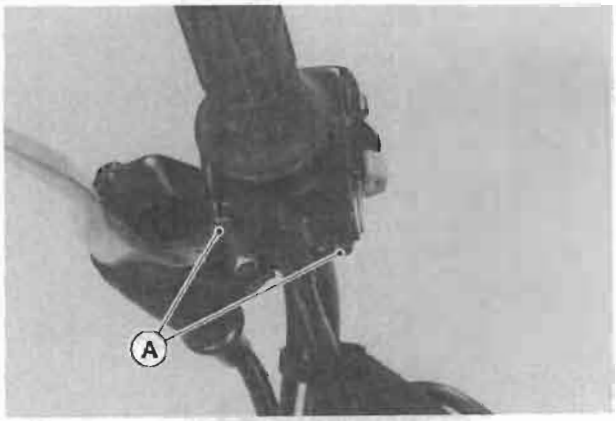

A. Screws

- Free the left-hand switch housing from the frame.

### *Engine Stop Switch Cleaning*

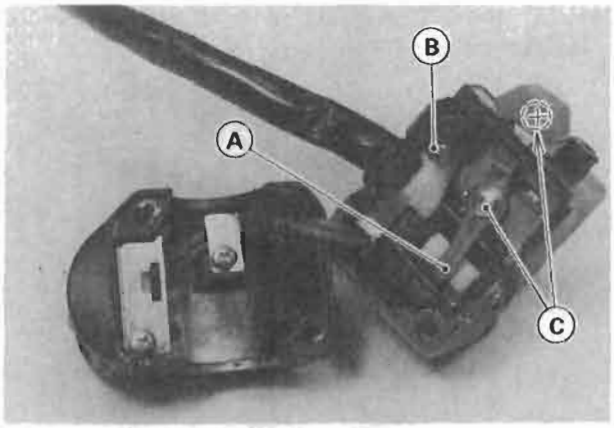
The engine stop switch is inside the left-hand housing. The switch and its component parts are not available separately. However, the switch may be removed for cleaning. Be very careful not to lose any parts, or the entire left-hand switch housing will have to be replaced.

- Take out the screws holding the left-hand switch case halves together.



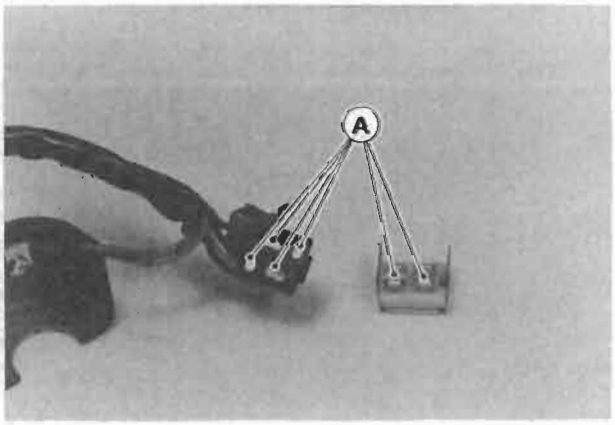

A. Screws

- Remove the switch lever screws and take out the lever.



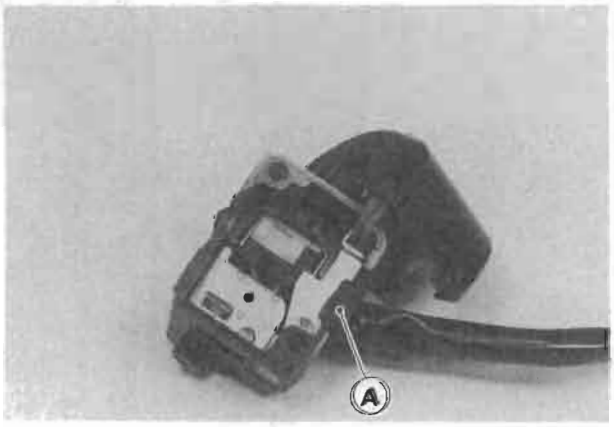

A. Switch Lever
B. Wiring Clamp Screw
C. Lever Screws

- Remove the wiring clamp screw and pull the switch free of the case.
- Clean any corrosion or dirt off the contacts.




A. Clean here.

- Push the switch parts down into the case.
- Apply adhesive to the wiring clamp and install it.



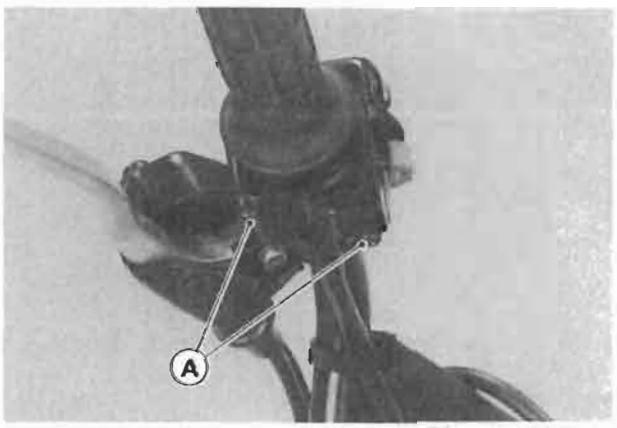

A. Wiring Clamp

- Put the switch lever in place and fasten it with a screw and washer.
- Assemble the left-hand switch housing on the handlebar and tighten the screws securely.

### *Light Switch Cleaning*

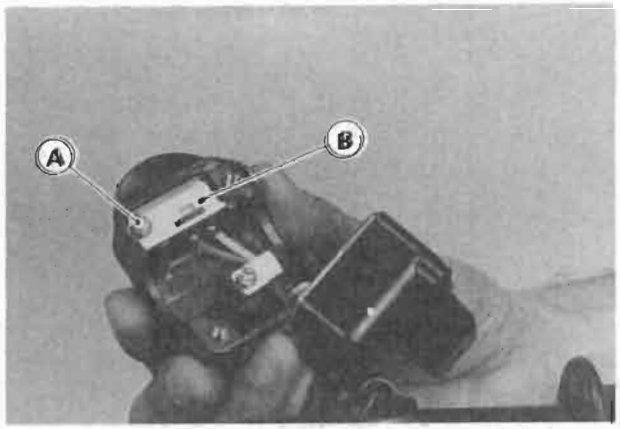
The light switch is inside the left-hand switch housing. The switch and its component parts are not available separately. However, the switch may be disassembled for cleaning. Be very careful not to lose any parts, or the entire left-hand switch case will have to be replaced.

- Take out the screws holding the left-hand switch case halves together.



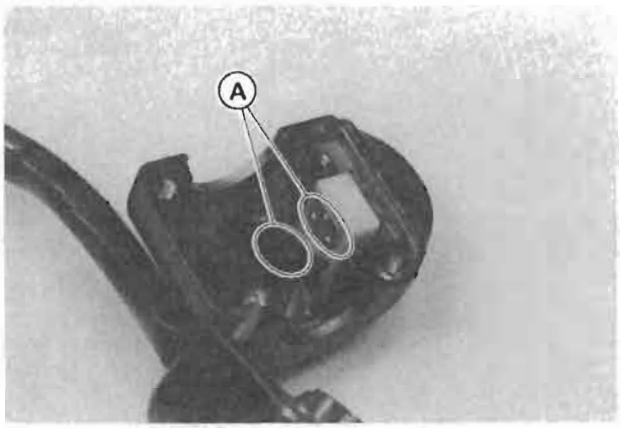

A. Screws

- Remove the screw to take off the holder in the lighting switch.
- Pull out the contact plate.




A. Screw
B. Holder

●Clean any corrosion or dirt off the contacts.




A. Clean here.

●Apply adhesive to the wiring clamp and install it.
●Reassemble the switch in the reverse order of disassembly.

### *Switch Inspection*

●Remove the front fender cover for switch inspection.
●Using the hand tester (special tool: 57001-983), check to see that only the connections shown in the table have continuity (about zero ohms).
★If the switch has an open or a short, clean or replace it with a new one.

**Engine Stop Switch Connections**

| | BK/W | BK |
|---|---|---|
| RUN | | |
| OFF | ○ | ○ |

**Light Switch Connections**

| | R | Y |
|---|---|---|
| ON | ○ | ○ |
| OFF | | |

**Ignition Switch Connections**

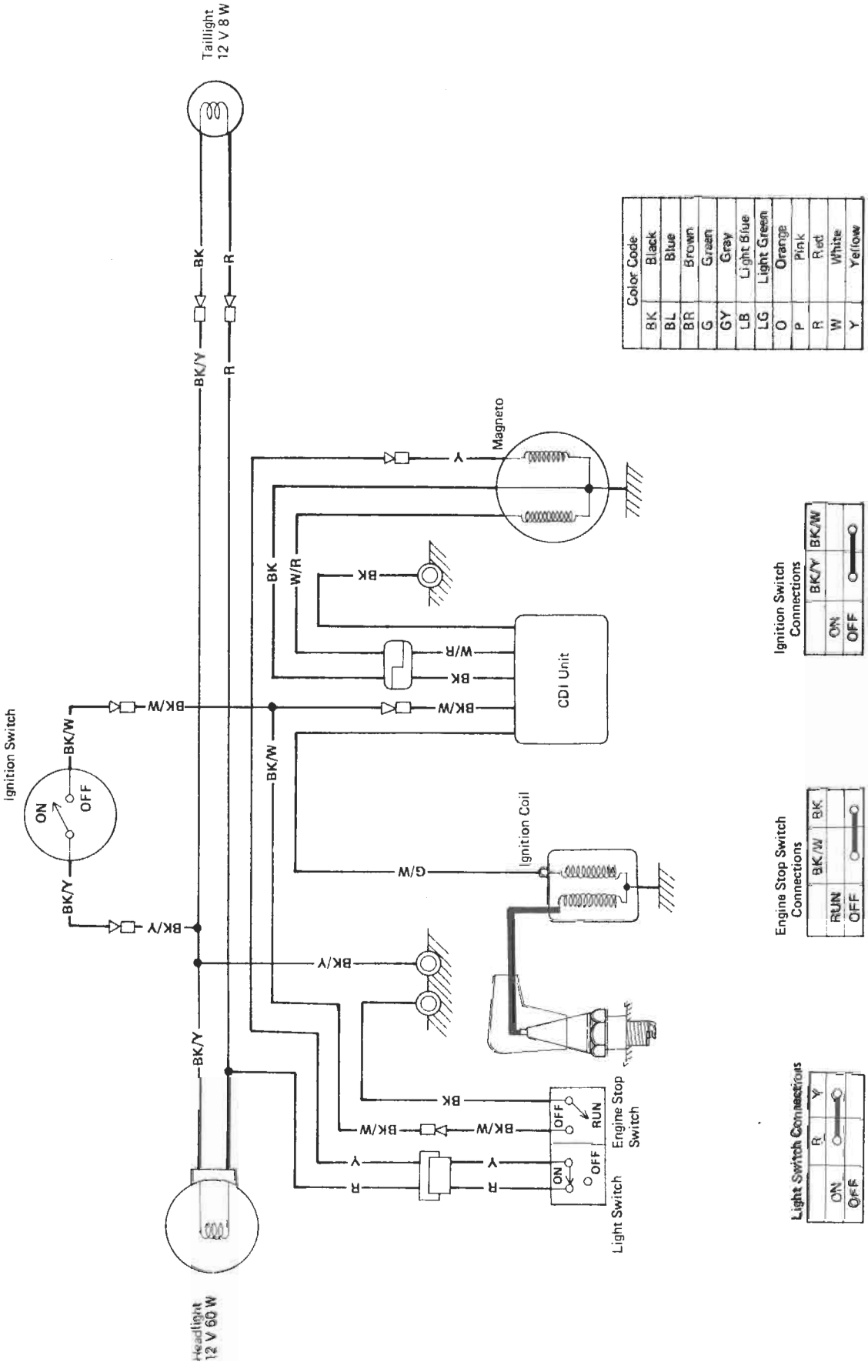
| | BK/Y | BK/W |
|---|---|---|
| ON | | |
| OFF | ○ | ○ |

## Electrical Wiring

### *Wiring Inspection*

●Visually inspect the wiring for signs of burning, fraying, etc.
★If any wiring is poor, replace the damaged wiring.
●Pull each connector apart and inspect it for corrosion, dirt, and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
●Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
○Connect the hand tester (special tool: 57001-983) between the ends of the leads.
○Set the tester to the x 1 Ω range, and read the tester.
★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the wiring loom if necessary.

## KXF250-A1 Wiring Diagram



# Appendix

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## Additional Considerations for Racing

This vehicle is designed for off-road use only. Off road vehicle riding is a wonderful sport, however, if improperly conducted, the sport has the potential to cause environmental problems as well as conflicts with other people.

KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR VEHICLE AND ITS OPERATION.

For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important points.

- You are entirely responsible for the use of your vehicle under racing or abnormal conditions, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's limited All Terrain Vehicle Warranty specifically excludes vehicles which are used in competition or related uses. Please read the warranty carefully.
- Vehicle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.

### Carburetor:

Sometimes an alteration may be desirable for improved performance under special conditions when proper mixture is not obtained after the carburetor has been properly adjusted, and all parts cleaned and found to be functioning properly.

If the engine still exhibits symptoms of overly rich or lean carburetion after all maintenance and adjustments are correctly performed, the main jet can be replaced with a smaller or larger one. A smaller numbered jet gives a leaner mixture and a larger numbered jet a richer mixture.

A certain amount of adjustment can be made by changing the position of the needle. There are five grooves at the top of the needle. Changing the position of the clip to a groove closer to the bottom raises the needle, which makes the mixture richer at a given position of the throttle valve.

**Jet Needle**




### Spark Plug:

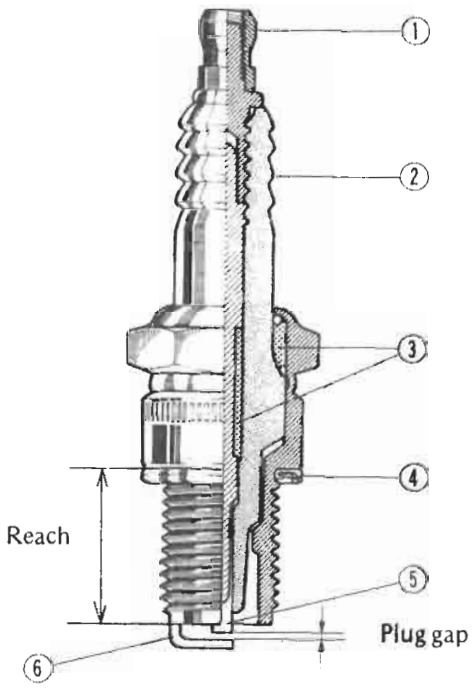
The spark plug ignites the fuel and air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plug must be used, and the spark plug must be kept clean and adjusted.

Tests have shown the plug listed in the General Information chapter to be the best plug for sporting or racing use.

Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of a correct heat range is used should be determined by removing and inspecting the plug.

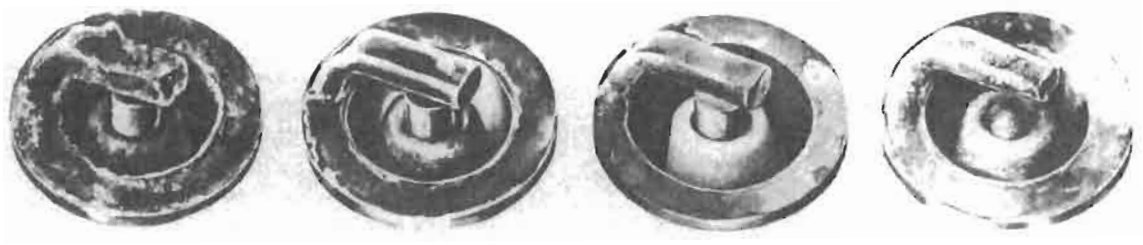
When a plug of the correct heat range is being used, the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400 – 800°C (750 – 1,450°F) and can be judged by noting the condition and color of the ceramic insulator around the center electrode. If the ceramic is clean and of a light brown color, the plug is operating at the right temperature.

**Spark Plug**




1. Terminal
2. Insulator
3. Cement
4. Gasket
5. Center Electrode
6. Side Electrode

**Spark Plug Condition**



Carbon Fouling | Oil Fouling | Normal Operation | Overheating

A spark plug for higher operating temperature sometimes may be needed for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too high a heat range is used – that is, a "cold" plug that cools itself too well – the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramic insulator.

The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will prevent an effective spark. Carbon build-up on the plug can also cause other troubles. It can heat up red-hot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

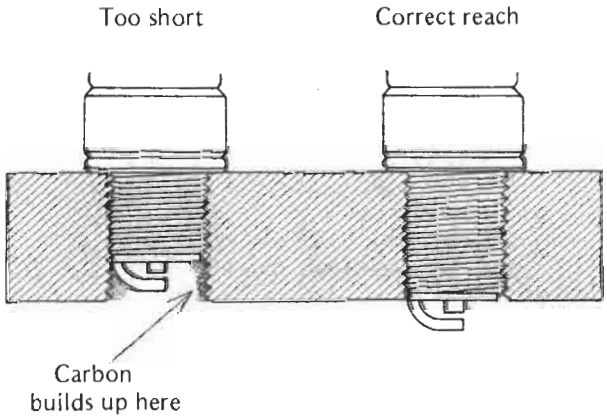
### *Spark Plug Inspection*

- Remove the spark plug and inspect the ceramic insulator.
- Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is black, it indicates that the plug is firing at too low a temperature, so the next hotter type should be used instead. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

**CAUTION**

- **If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same type electrode (regular type or projected type) as the standard plug.**
- **If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.**
- **If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.**

**Plug Reach**




**Standard Spark Plug Threads**

| | |
|---|---|
| Diameter: | 14 mm |
| Pitch: | 1.25 mm |
| Reach: | 19 mm |

**NOTE**

- *The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).*

## Troubleshooting Guide

**NOTE**

*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties. Electrical troubleshooting is not covered here due to its complexity. For electrical problems, refer to the appropriate heading in the Electrical System chapter.*

### Engine Doesn't Start or Starting Difficulty:

**Engine won't turn over:**
- Cylinder, piston seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Balancer bearing seizure
- Kick return spring broken
- Kick gear not engaging
- Clutch release maladjusted

**Cylinder Compression Low:**
- Cylinder, piston worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal leak
- Reed valve damaged
- Cylinder nut loose
- Cylinder base gasket damaged

**No spark; spark weak:**
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap not in good contact
- CDI unit trouble
- Exciter coil trouble
- Ignition coil trouble
- Magneto flywheel trouble
- Ignition switch or engine stop switch shorted
- Wiring shorted or open

**No fuel flow:**
- No fuel in fuel tank
- Tank cap air vent obstructed
- Fuel hose clogged
- Fuel tap clogged
- Float valve clogged
- Pilot jet clogged

**Engine flooded:**
- Fuel level too high
- Float valve worn or stuck open
- Starting technique faulty
- (When flooded, crank with the throttle fully open allow more air to reach the engine.)

### Poor Running at Low Speed:

**Spark weak:**
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- CDI unit trouble
- Exciter coil trouble
- Ignition coil trouble
- Magneto flywheel trouble

**Fuel/air mixture incorrect:**
- Idle adjusting screw maladjusted
- Pilot jet, or air passage clogged
- Starter plunger stuck open
- Air cleaner clogged, poorly sealed, or missing
- Fuel level too high or too low
- Fuel tank air vent obstructed
- Water or foreign matter in fuel
- Carburetor holder loose
- Air cleaner duct loose

**Cylinder Compression low:**
- Cylinder, piston worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal leak
- Reed valve damaged
- Cylinder nut loose
- Cylinder base gasket damaged

**KIPS sub-ports stuck open:**
- KIPS valves stuck open (valve seizure, or carbon accumulation)
- KIPS valves assembled incorrectly
- KIPS governor spring damaged
- KIPS valve operating rod seized in cylinder
- KIPS governor shaft(s) seized in right engine cover

**Other:**
- Ignition timing incorrect
- Transmission oil viscosity too high
- Throttle valve doesn't slide smoothly
- Brake dragging

### Poor Running or No Power at High Speed:

**Fuel air/mixture incorrect:**
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel hose clogged
- Air cleaner clogged, poorly seated, or missing
- Starter plunger stuck open
- Water or foreign matter in fuel
- Carburetor holder loose
- Air cleaner duct loose
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Fuel level too high or too low

**Cylinder Compression low:**
- Cylinder, piston worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal leak
- Reed valve damaged
- Cylinder nut loose
- Cylinder base gasket damaged

**Firing incorrect:**
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- CDI unit trouble
- Exciter coil trouble
- Ignition coil trouble

**Knocking:**
- Ignition timing advanced
- Fuel poor quality
- Carbon built up in combustion chamber
- Spark plug incorrect

**KIPS sub-ports stuck closed:**
- KIPS valves stuck closed (valve seizure, or carbon accumulation)
- KIPS valves assembled incorrectly
- Sub-ports clogged (carbon accumulation)
- KIPS valve operating rod seized in cylinder
- KIPS governor lever shaft seized in right engine cover

**Other:**
- Ignition timing incorrect
- Brakes dragging
- Overheating
- Clutch slipping
- Throttle valve does not fully open
- Transmission oil quantity excessive
- Transmission oil viscosity too high

## Overheating:
- Coolant level too low
- Coolant deteriorated
- Coolant hose obstructed
- Air in coolant
- Radiator clogged
- Radiator cap faulty
- Water pump not rotating
- Water pump impeller damaged
- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- Ignition timing retarded
- Carbon built up in combustion chamber
- Brakes dragging
- Clutch slipping
- Carburetor holder loose
- Air cleaner poorly sealed, or missing
- Air cleaner duct loose
- Air cleaner clogged
- Main jet clogged
- Fuel level too low

## Clutch Operation Faulty:
**Clutch slipping:**
- No clutch lever play
- Friction and/or steel plate worn or warped
- Clutch spring broken or weak
- Clutch hub or housing unevenly worn
- Clutch inner cable not sliding smoothly

**Clutch doesn't disengage properly:**
- Clutch lever play excessive
- Clutch plates warped or damaged
- Clutch spring compression uneven
- Transmission oil deteriorated or of too high viscosity
- Clutch inner cable not sliding smoothly
- Clutch hub frozen on shaft

## Gear Shifting Faulty:
**Doesn't go into gear; shift pedal doesn't return:**
- Clutch not disengaging
- Shift fork(s) bent or seized
- Gear(s) stuck on the shaft
- Shift return spring weak or broken
- Shift mechanism arm spring broken
- Shift return spring pin loose
- Shift drum positioning lever binding on pivot
- Shift mechanism arm broken
- Shift drum damaged

**Jumps out of gear:**
- Shift fork(s) worn
- Gear groove(s) worn
- Shift drum groove(s) worn
- Shift drum positioning lever spring weak or broken
- Shift fork guide pin(s) worn
- Shift mechanism arm spring weak or broken
- Drive shaft, output shaft, and/or gear splines worn

**Overshifts:**
- Shift drum positioning lever spring weak or broken
- Shift mechanism arm spring weak or broken

## Abnormal Engine Noise:
**Knocking:**
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Incorrect spark plug heat range
- Engine overheating

**Piston slap:**
- Cylinder/piston clearance excessive
- Cylinder, piston worn
- Connecting rod bent
- Piston pin, piston holes worn

**Other noise:**
- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring(s) worn, broken or stuck
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive

Engine mount(s) loose
Crankshaft bearing worn
Loose magneto flywheel
Primary gear worn or chipped
Balancer gear worn or chipped
Balancer bearing worn
Balancer gear installation incorrect

### Abnormal Drive Train Noise:

**Clutch noise:**
Clutch housing and/or hub damaged
Clutch rubber damper deteriorated
Clutch housing/friction plate clearance excessive
Clutch housing gear/primary gear backlash excessive
Metal chip jammed in clutch housing gear teeth

**Transmission noise:**
Crankcase bearing worn
Transmission gear worn or chipped
Metal chip jammed in gear teeth
Transmission oil insufficient or too thin
Kick ratchet not properly disengaging from kick gear

**Drive chain noise:**
Chain worn
Rear and/or engine sprocket(s) worn
Chain lubrication insufficient

### Abnormal Frame Noise:

**Shock absorber noise:**
Shock absorber damaged
Swing or suspension arm bearing(s) damaged
Swing or suspension arm bearing(s) lubrication insufficient

**Disc brake noise:**
Pad loose
Pad installed reversely
Pad surface glazed
Disc warped

**Other noise:**
Brackets, nuts, bolts, etc. not properly mounted or tightened

### Handling and/or Stability Unsatisfactory:

**Handlebar hard to turn:**
Steering stem bearing damaged
Steering stem lubrication inadequate
Steering stem bent
Tire air pressure too low

**Handlebar shakes or excessively vibrates:**
Tire(s) worn
Swing arm suspension arm bearing(s) worn
Steering knuckle joint(s) worn
Wheel rim(s) warped
Rear axle runout excessive
Wheel bearing(s) worn
Handlebar clamps loose
Steering stem bottom nut and/or stem clamp bolt(s) or nut(s) loose

**Handlebar pulls to one side:**
Frame bent
Wheel misalignment
Swing arm bent or twisted
Suspension arm bent or twisted
Steering stem bent
Front or rear tire air pressure unbalanced
Front shock absorber unbalanced

**Shock absorption unsatisfactory:**
(Too hard)
Tire air pressure too high
Shock absorber maladjusted
(Too soft)
Shock absorber oil leaking
Shock absorber spring weak
Tire air pressure too low
Shock absorber maladjusted

### Brakes Don't Hold:

Air in the brake line
Brake fluid leak
Brake fluid deteriorated
Primary or secondary cup trouble
Master cylinder scratched inside
Brake not properly adjusted
Pad overworn or worn unevenly
Oil, grease on pads and disc
Disc worn or warped
Brake overheated

## General Lubrication

### *Lubrication*

Lubricate the points shown below, with either motor oil or regular grease in accordance with the Periodic Maintenance Chart.

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.

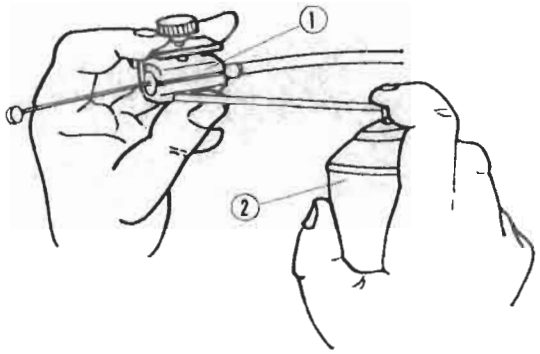
**NOTE**

- *Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

**Shafts or Pins: Lubricate with Motor Oil.**
Clutch Lever Shaft
Kick Pedal Pivot
**Cables: Lubricate with Motor Oil**
Parking Brake Cable
Throttle Cables
Clutch Cable

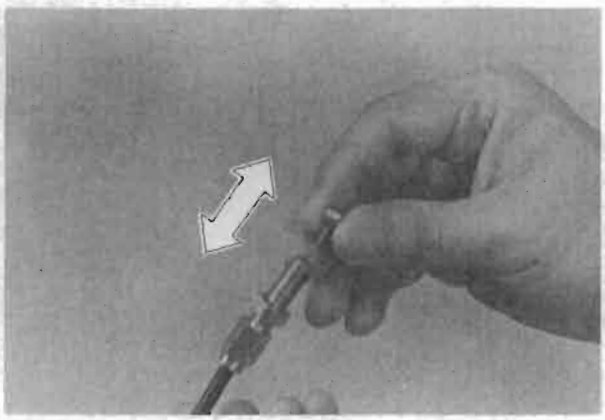
●Lubricate the cables by seeping the oil between the cable and cable housing.
○The cable may be lubricated by using a pressure cable luber (special tool) with an aerosol cable lubricant.

**Cable Lubrication**




1. Pressure Cable Luber: K56019-021
2. Aerosol Cable Lubricant

●With the cable disconnected at the both ends, the cable should move freely within the cable housing.



★If cable movement is not free after lubricating, if the cable is frayed, or if the cable housing is kinked, replace the cable.

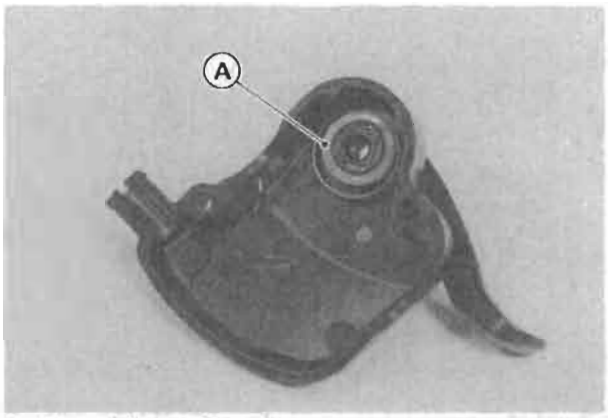
**Slide Points: Lubricate with Grease**
Throttle Cable Upper End



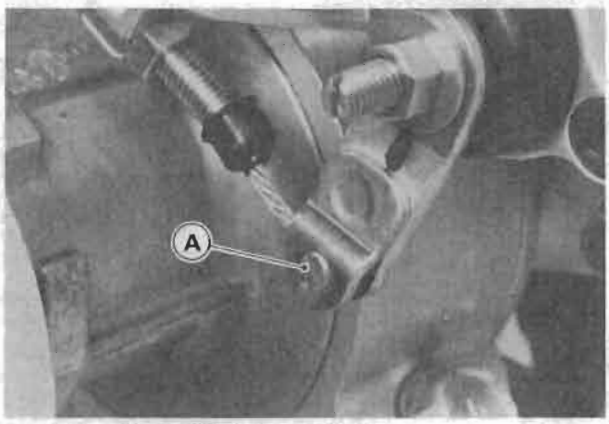

A. Throttle Cable Upper End

Throttle Lever
Clutch Cable Upper and Lower Ends
Parking Brake Cable Upper and Lower Ends
Brake Pedal Pin Joint

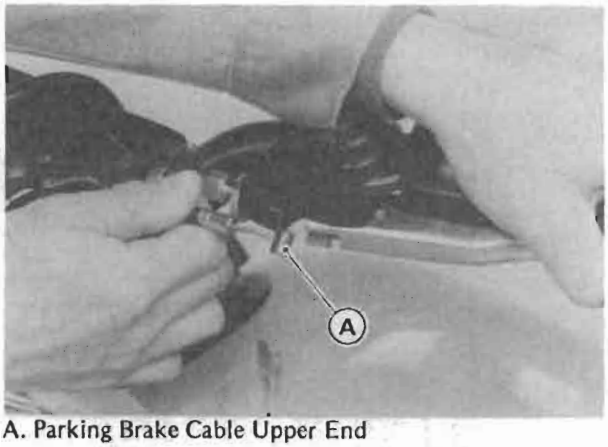
●Apply a thin coating of multi-purpose grease to the throttle lever pivot area and the throttle cable ends.



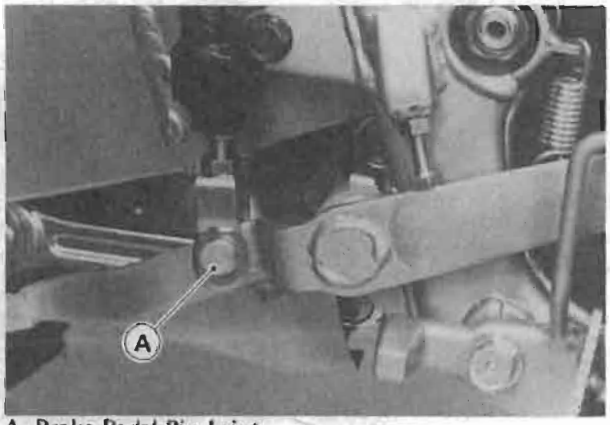

A. Throttle Lever Pivot Area




A. Parking Brake Cable Lower End




A. Parking Brake Cable Upper End




A. Brake Pedal Pin Joint

## Bolt and Nut Tightening

### *Tightness Inspection*

•Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

**NOTE**

○*Check engine fastener tightness when the engine is cold (at room temperature).*

★If there are loose fasteners, retighten them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not listed in the appropriate chapter, see the basic torque table (see Torque and Locking Agent in the General Information chapter). For each fastener, first loosen it by ½ turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

**Bolts, Nuts, and Fasteners to be checked**

**Wheels:**
- Front Hub Nuts and Cotter Pins
- Rear Hub Nuts and Cotter Pins
- Wheel Nuts

**Brakes:**
- Brake Hose Banjo Bolts
- Front Master Cylinder Clamp Bolts
- Rear Master Cylinder Mounting Bolts
- Caliper Mounting Bolts
- Brake Lever Shaft Nut
- Brake Pedal Shaft Cotter Pin
- Brake Pedal Pin Joint Cotter Pin
- Torque Link Nuts and Safety Clips
- Parking Brake Cable Adjusting Nuts

**Steering/Suspension:**
- Handlebar Clamp Bolts
- Tie-Rod End Nuts and Cotter Pins
- Tie-Rod Adjusting Sleeve Locknuts
- Shock Absorber Mounting Bolts and Nuts
- Suspension Arm Pivot Bolts and Nuts
- Swing Arm Shaft Nut
- Steering Knuckle Joint Nuts and Cotter Pins

**Engine:**

**Engine:**
- Engine Mounting Bolts and Nuts
- Engine Mounting Bracket Bolts
- Muffler Mounting Bolts and Nut
- Muffler Clamp Bolt
- Shift Pedal Bolt
- Water Hose Clamp Bolts
- Radiator Mounting Bolts
- Kick Pedal Nut

**Others:**
- Footpeg Bracket Bolts
- Grab Rail Mounting Bolts
- Rear Fender Mounting Bolts
- Left Switch Housing Screws
- Throttle Case Clamp Screws
- Bearing Housing Mounting Bolts (Rear Axle Shaft)
- Rear Sprocket Mounting Nuts

## Unit Conversion Table

### Prefixes for Units:

| Prefix | Symbol | Power |
|---|---|---|
| mega | M | x 1,000,000 |
| kilo | k | x 1,000 |
| centi | c | x 0.01 |
| milli | m | x 0.001 |
| micro | $\mu$ | x 0.000001 |

### Units of Mass:

| | | | | |
|---|---|---|---|---|
| kg | x | 2.205 | = | lb |
| g | x | 0.03527 | = | oz |

### Units of Volume:

| | | | | |
|---|---|---|---|---|
| L | x | 0.2642 | = | gal (US) |
| L | x | 0.2200 | = | gal (imp) |
| L | x | 1.057 | = | qt (US) |
| L | x | 0.8799 | = | qt (imp) |
| L | x | 2.113 | = | pint (US) |
| L | x | 1.816 | = | pint (imp) |
| mL | x | 0.03381 | = | oz (US) |
| mL | x | 0.02816 | = | oz (imp) |
| mL | x | 0.06102 | = | cu in |

### Units of Force:

| | | | | |
|---|---|---|---|---|
| N | x | 0.1020 | = | kg |
| N | x | 0.2248 | = | lb |
| kg | x | 9.807 | = | N |
| kg | x | 2.205 | = | lb |

### Units of Length:

| | | | | |
|---|---|---|---|---|
| km | x | 0.6214 | = | mile |
| m | x | 3.281 | = | ft |
| mm | x | 0.03937 | = | in |

### Units of Torque:

| | | | | |
|---|---|---|---|---|
| N-m | x | 0.1020 | = | kg-m |
| N-m | x | 0.7376 | = | ft-lb |
| N-m | x | 8.851 | = | in-lb |
| kg-m | x | 9.807 | = | N-m |
| kg-m | x | 7.233 | = | ft-lb |
| kg-m | x | 86.80 | = | in-lb |

### Units of Pressure:

| | | | | |
|---|---|---|---|---|
| kPa | x | 0.01020 | = | $kg/cm^2$ |
| kPa | x | 0.1450 | = | psi |
| kPa | x | 0.7501 | = | cm Hg |
| $kg/cm^2$ | x | 98.07 | = | kPa |
| $kg/cm^2$ | x | 14.22 | = | psi |
| cm Hg | x | 1.333 | = | kPa |

### Units of Speed:

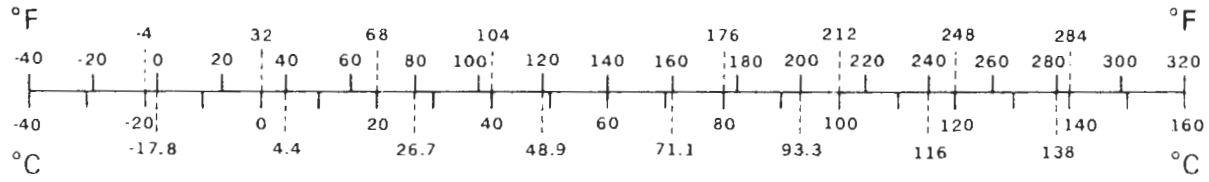
| | | | | |
|---|---|---|---|---|
| km/h | x | 0.6214 | = | mph |

### Units of Power:

| | | | | |
|---|---|---|---|---|
| kW | x | 1.360 | = | PS |
| kW | x | 1.341 | = | HP |
| PS | x | 0.7355 | = | kW |
| PS | x | 0.9863 | = | HP |

### Units of Temperature:

$$\frac{9\,(°C + 40)}{5} - 40 = °F \qquad \frac{5\,(°F + 40)}{9} - 40 = °C$$



## MODEL APPLICATION

| Year | Model | Beginning Frame No. |
|---|---|---|
| 1987 | KXF250-A1 (US, Canada) | JKAXFMA1□HB500001 (Lincoln) |

□ : This digit in the frame number changes from one machine to another.

KAWASAKI
HEAVY INDUSTRIES, LTD.
MOTORCYCLE GROUP

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